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PB-284 615

A Mathematical Model of Electrostatic Precipitation. (Revision 1): Volume II User Manual

Southern Research Inst, Birmingham, Ala

Prepared for

Industrial Environmental Research Lab, Research Triangle Park, N C

Jun 78

United States
Environmental Protection
Agency

Industrial Environmental Research
Laboratory
Research Triangle Park NC 27711

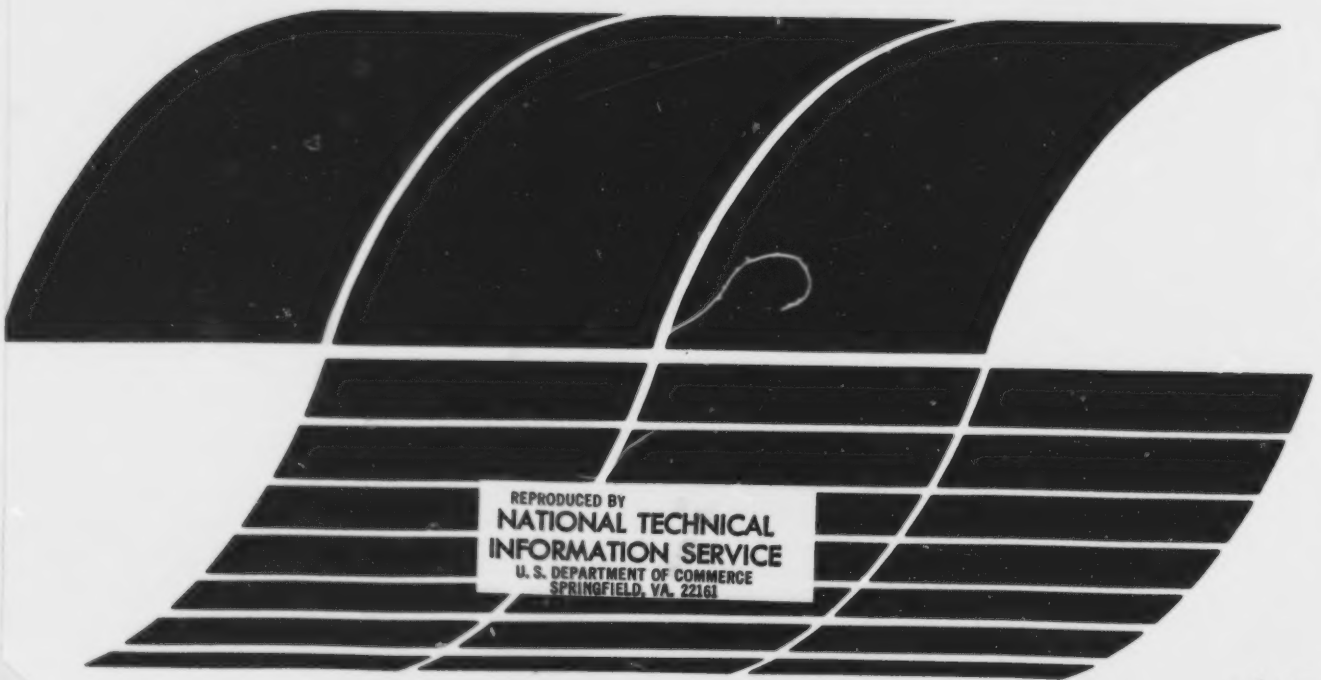
EPA-600/7-78-111b
June 1978

Research and Development

PB 284 615

A Mathematical Model of Electrostatic Precipitation (Revision 1): Volume II. User Manual

Interagency Energy/Environment R&D Program Report



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TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-600/7-78-111b		PB284615

4. TITLE AND SUBTITLE	5. REPORT DATE
A Mathematical Model of Electrostatic Precipitation (Revision 1): Volume II. User Manual	June 1978
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Jack R. McDonald	SORI-EAS-78-101 3540-6
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
Southern Research Institute 2000 Ninth Avenue, South Birmingham, Alabama 35205	1AB012; ROAP 21ADL-027
	11. CONTRACT/GRANT NO.
	68-02-2114
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711	Revision; 6/75-2/78
	14. SPONSORING AGENCY CODE
	EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Leslie E. Sparks, Mail Drop 61, 919/541-2925. EPA-650/2-75-037 was the initial report.

16. ABSTRACT The report gives a comprehensive description of how to use the computer program which performs the calculations in the mathematical model of electrostatic precipitation, and instructs in the proper usage of the model. It describes in detail input and output data associated with the computer program, and presents the data in various forms covering the different uses of the model. It compares the predictions of the model with experimental data and discusses the agreement obtained. It describes the various applications of the model and demonstrates them in detail. It discusses applications of the model for troubleshooting and sizing of precipitators, emphasizing throughout the precautions to be taken in using the model.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution	Air Pollution Control	13B
Dust	Stationary Sources	11G
Electrostatic Precipitation	Particulates	13H
Mathematical Models	User Manual	12A
Computer Programs	Troubleshooting	09B
Maintenance		15E
Size Determination		14B

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Unlimited	Unclassified	647
	20. SECURITY CLASS (This page)	22. PRICE
	Unclassified	PCA 27/MF

EPA Form 2220-1 (9-73)

EPA-600/7-78-111b
June 1978

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Contract No. 68-02-2114
ROAP No. 21ADL-027
Program Element No. 1AB012

EPA Project Officer: Leslie E. Sparks

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Office of Energy, Minerals, and Industry
Research Triangle Park, NC 27711

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Washington, DC 20460

3-9

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ABSTRACT

The objectives of this manuscript are to provide a comprehensive description of how to use the computer program which performs the calculations in the mathematical model of electrostatic precipitation and to instruct in the proper usage of the model. The input and output data associated with the computer program are described in detail and are presented in various forms covering the different uses of the model. Comparisons of the predictions of the model with experimental data are presented and the agreement obtained is discussed. The various applications of the model are described and demonstrated in detail. Applications of the model for troubleshooting and sizing of precipitators are discussed. Precautions to take in using the model are emphasized throughout the text.

This report was submitted in partial fulfillment of Task VI of Contract No. 68-02-2114 by Southern Research Institute under the sponsorship of the U.S. Environmental Protection Agency. This report covers a contract period from June 30, 1975 to February 28, 1978, and work was completed as of February 15, 1978.

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METRIC CONVERSION FACTORS

To convert from	to	Multiply by
grains/ft^3	kg/m^3	0.00229
ft	m	0.3048
ft^2	m^2	0.0929
in	m	0.0254
ft^3/min	m^3/sec	0.000472
ft/sec	m/sec	0.3048
°F	°K	$(°F+459) \times \frac{1}{1.8}$

SECTION 1

INTRODUCTION

The objectives of this manuscript are to provide a comprehensive description of how to use the computer program which performs the calculations in the mathematical model of electrostatic precipitation and to instruct in the proper usage of the model. The text deals with the input and output data associated with the computer program and with applications of the model. The theories and numerical techniques associated with the model and the details of the internal workings of the computer program are presented in Volume 1. Since Volume 1 provides the basic understanding of what the computer program does, it is strongly recommended that Volume 1 be studied before one attempts to utilize the contents in Volume 2. Volumes 1 and 2 should be used in conjunction with one another in order to obtain the fullest benefits of the model.

In this text, the input and output data associated with the computer program are described in detail and are presented in various forms covering the different uses of the model. Any restrictions on the input variables are discussed and guidelines are given for specifying the values of those input variables whose values may be uncertain.

The different ways in which the model can be used to analyze and project precipitator performance are discussed and demonstrated in examples. Comparisons of the predictions of the model with experimental data are presented and the agreement obtained is discussed. For all examples utilizing the computer program, the input data are presented in tabular form in the main text and the computer printouts of the output data are presented in appendices. Thus, a user can easily run the example cases and has a means of checking his results.

Methods for using the model in troubleshooting and sizing precipitators are discussed. These methods employ the various applications of the model in specific ways in order to obtain specific information. Since, in applying the model to troubleshooting and sizing precipitators, it is very important that the model be used properly, a section of the text is devoted to emphasizing precautions which must be taken when using the model for these purposes.

SECTION 2

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The new computer program which performs the calculations required by the mathematical model of electrostatic precipitation is more user oriented than the previous program due to modifications that make the input data less cumbersome, make the output data more complete and useful, result in savings of computer time, and allow for the construction of log-normal particle size distributions. Comparisons of the predictions of the model with experimental data indicate that the model can be used sucessfully to describe the operation of electrostatic precipitators. The effect on precipitator performance of changes in particle size distribution, specific collection area, current density, nonideal conditions, and the resistivity of the collected particulate layer can be easily obtained. In those cases where the use of computer time is an important consideration, the application of an estimation procedure can result in considerable savings in computer time. Discussions on the use of the model for troubleshooting and sizing of precipitators and on precautions to use in applying the model provide a basis for practical applications of the model.

RECOMMENDATIONS

It is recommended that the following work be performed in order to make the computer program more user oriented:

1. Alternative numerical techniques need to be investigated and implemented in order to make the computer program run significantly faster.

2. Procedures which edit the input data should be implemented.

3. Documentation of the computer program needs to be included in abbreviated form in the computer card deck.

SECTION 3

DESCRIPTION OF INPUT DATA

GENERAL DESCRIPTION

The format of the original computer program which performs the calculations in the model for electrostatic precipitation has been re-structured to make the inputting of data less cumbersome. The number of cards which is necessary to input data has been reduced significantly by allowing different operating conditions to be analyzed from one basic set of input data. Due to the fact that several options are available in using the model, the number of cards and type of information in the input data may vary from one set of data to the next. Thus, it is necessary for the user to familiarize himself with the logic associated with the input data in order to ensure that the desired operations will be performed.

Some of the input variables are read into the program in British units whereas others are in MKS units. All input data which are in British units are converted to MKS units prior to performing the calculations. The input variables and format specifications are discussed in detail in the following subsection.

CONSTRUCTION OF THE BASIC DATA SET

The following is a sequential listing of the variables in the first group of data which is read in, along with the descriptions of the variables and the format specifications.

(1) NENDPT is the number of discrete points on a cumulative percent versus particle diameter curve. NENDPT is specified by the user and must have a value of at least 1 but not greater than 21. If NENDPT has a value of 99, the program terminates. If 21<NENDPT<99, the program will terminate abnormally during execution. NENDPT is read in with an I2 format and must be right justified in columns 1-2.

(2) NDATA is an indicator which tells the program to look for a certain type of data set. NDATA can have four possible values which will cause the program to look for the following data set types:

1 - A complete data set must be inputted. NDATA must have this value on the first data set.

2 - Only cards 1 and 2 and data concerning size distribution information must be inputted. All other data remain as defined in the previous data set. NDATA can have this value only after a basic data set has been run. This value of NDATA allows one to examine the effects of particle size distribution on precipitator performance with all other variables held fixed.

3 - Only cards 1 and 2 and information concerning the gas volume flow and gas velocity must be inputted. All other data remain as defined in the previous data set. NDATA can have this value only after a basic data set has been run. This value of NDATA allows one to examine the effects of specific collection area (SCA) on precipitator performance with all other variables held fixed.

4 - Only cards 1 and 2 and information concerning the applied voltage and current must be inputted. All other data remain as defined in the previous data set. NDATA can have this value only after a basic data set has been run. This value of NDATA allows one to examine the effects of the electrical conditions on precipitator performance with all other variables held fixed.

NDATA is read in with an I2 format and must be right justified in columns 3-4. If NDATA $\neq$ 1,2,3, or 4, an error message will be given by the computer at the point in the program where NDATA is used in a "computed go to statement" (line 64). Depending on the particular computer, the program may or may not terminate at this point. If the program continues to execute, it may terminate abnormally at a later point in the program due to incorrect usage of the input data. If the program terminates normally, the calculations may or may not be correct, depending on the input data and the action taken by the computer.

The overall format for this group is (2I2). The data contained in this group is on the first card and this card must be the first card in each new data set.

Data group 2 is for specifying information which will identify the data set which is under consideration. All or part of columns 1-80 on data card 2 can be used in identifying the data set. The overall format for this card is (40A2). This data group must be the second card in each new data set.

At this point, the third and successive data groups depend on the choice of the value of NDATA. The basic data set must be read into the program before shortened data sets can be used. For NDATA=1, the program reads in the data groups in the basic data set in the sequence discussed below.

The following is a sequential listing of the variables in data group 3, along with the descriptions of the variables and the format specifications.

(1) NEST is an indicator which can have the values of 1 and 2. If NEST = 1, the program will perform extensive, detailed calculations in order to determine precipitator performance. If NEST = 2, estimation procedures are used to determine precipitator performance. Both of these options have been discussed in detail in Volume 1. Use of the estimation procedure will result in considerable savings in computer time and can be used to establish trends or to establish ranges over which to apply the more rigorous calculations. NEST is read in with an I2 format and must be right justified in columns 1-2.

(2) NDIST is an indicator which can have the values of 1 and 2. If NDIST = 1, the user must supply the inlet particle size distribution. If NDIST = 2, the program will construct a log-normal particle size distribution based on parameters provided by the user. The technique used to construct the log-normal size distribution is described in Volume 1. NDIST is read in with an I2 format and must be right justified in columns 3-4.

(3) NVI is an indicator which can have the values of 1 and 2. If NVI = 1, the user must supply known or measured values of the operating applied voltage and current. If NVI = 2, the program will construct a voltage-current curve (or curves) for a specified wire-plate geometry up to a voltage which is specified by the user. Both of the techniques for determining the electrical conditions are discussed in Volume 1. NVI is read in with an I2 format and must be right justified in columns 5-6.

(4) NX is the number of grid points in the x-direction (perpendicular to the gas flow) which is used in the numerical techniques that determine the electrical conditions. NX can not exceed a value of 15. If NVI = 1, sufficient accuracy can normally be obtained with NX $\geq$ 11. If NVI = 2, NX should be set equal to 15. NX is read in with an I2 format and must be right justified in columns 7-8.

(5) NY is the number of grid points in the y-direction (parallel to the gas flow) which is used in the numerical techniques that determine the electrical conditions. If NVI = 1, sufficient accuracy can normally be obtained with NY > 9. If NVI = 2, NY should be set equal to 15. NY is read in with an I2 format and must be right justified in columns 9-10.

(6) NITER is an indicator which serves two different purposes. If NVI = 1, the value of NITER determines the maximum number of iterations the program will make on a loop which converges on overall mass collection efficiency. If the overall mass collection efficiency converges within 0.05% before NITER iterations, the calculation of collection efficiencies is completed at this point. NITER serves the purpose of cutting the calculation off in a reasonable amount of time when convergence requires more iterations and computer time than is warranted. For normal inlet mass loadings and particle size distributions a value of NITER = 2 is sufficient. For high inlet mass loadings or very fine particle size distributions a value of NITER = 3 or 4 may be necessary to provide sufficient accuracy. If NVI = 2, the value of NITER determines the number of iterations which will be performed over each incremental length of the precipitator in order to obtain self-consistent solutions for the electrical conditions. In its present stage of development, the calculation procedure yields the same results for all values of NITER. Thus, in this case, set NITER = 1. The calculation procedure is discussed in Appendix A of Volume 1. NITER is read in with an I2 format and must be right justified in columns 11-12.

(7) NCALC is an indicator which can have the values of 0 and 1. If NCALC = 0, particle charge is determined by using equation (12) in Volume 1. Due to the number of times particle charge must be calculated and the use of numerical techniques in order to solve the charging equation, the particle charging calculations for NCALC = 0 take a considerable amount of computer time. If NCALC = 1, particle charge is estimated empirically by using the sum of the charges predicted from classical field and thermal charging theories [see equation (15) in Volume 1]. In this case, particle charge can be determined very rapidly from analytical expressions. Thus, in those cases where a significantly shorter run time is more important than the best accuracy possible, NCALC should be set equal to 1. If NEST = 2, particle charge will be performed as if NCALC = 1 regardless of the value of NCALC. NCALC is read in with an I2 format and must be right justified in columns 13-14.

(8) NRAPD is an indicator which specifies the number of rapping puff particle size distributions which will be utilized by the program in predicting the effect of rapping reentrainment on overall mass collection efficiency. NRAPD must have a value of at least 1 and can not exceed a value of 10. If NRAPD = 1, the program will determine the rapping puff particle size distribution based on the average of data obtained from several field tests on full-scale precipitators. These tests yield an average rapping puff particle size distribution with a mass median diameter (MMD) of 6.0 μm and a geometric standard deviation (σ_p) of 2.5. The technique which is used to predict rapping losses is discussed in Volume 1. If NRAPD is greater than one, the user must supply a MMD and σ_p of a log-normal distribution corresponding to each value of NRAPD greater than 1. The program will determine the rapping puff particle size distribution based on the specified combinations of MMD and σ_p. The case for NRAPD = 1 will always be performed. Each rapping puff particle size distribution is used in conjunction with the same basic ideal calculation and its effect is determined with very little expenditure of computer time. NRAPD is read in with an I2 format and must be right justified in columns 15-16.

(9) NEFF is an indicator which can have the values of 1 and 2. If NEFF = 1, the total mass reentrained at the outlet due to rapping is determined from the mass collected in the last field under adjusted no-rap conditions. If NEFF = 2, the total mass reentrained at the outlet due to rapping is determined from the mass which would be collected in the last field under unadjusted ideal conditions. NEFF should normally be taken to be 1 since this case is physically meaningful. A value of NEFF = 2 will result in rapping losses which are significantly greater than for NEFF = 1. Thus, a value of NEFF = 2 should only be used when a precipitator design which is conservative with respect to rapping losses is desired. NEFF is read in with an I2 format and must be right justified in columns 17-18.

(10) NTEMP is an indicator which can have the values of 1 and 2. The mass reentrained due to rapping will differ for cold-side and hot-side precipitators. If NTEMP = 1, the mass reentrained due to rapping is estimated based on an equation for cold-side precipitators. If NTEMP = 2, the mass reentrained due to rapping is estimated based on equation for hot-side precipitators. NTEMP is read in with an I2 format and must be right justified in columns 19-20.

(11) NONID is an indicator which specifies the number of combinations of normalized gas velocity standard deviation (σ_g) and gas bypassage fraction and/or particle reentrainment fraction without rapping (S) which are to be used to simulate the possible nonideal conditions. The procedures used to account for these nonideal effects are described in Volume 1. NONID must have a value of at least 1 and can not exceed a value of 15. Each set of nonideal conditions is used in conjunction with the same basic ideal calculation and its effect is determined with very little expenditure of computer time. NONID is read in with an I2 format and must be right justified in columns 21-22.

The overall format for this data group is (11I2) and all the data are contained on the third data card.

The next data group which is read in depends on the values of NCALC and NVI. If NCALC = 0, the rigorous charging theory is used. In this case, the following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) NN is the number of increments in the Runge-Kutta integration of equation (12) in Volume 1. If NVI = 1, a value of NN = 10 normally provides sufficient accuracy when the precipitator is divided into incremental lengths of approximately 0.305m or less. If NVI = 2, a value of NN = 5 normally provides sufficient accuracy. NN is read in with an I2 format and must be right justified in columns 1-2.

(2) NUMINC is the number of increments in the Simpson's Rule integration over θ in equation (12) in Volume 1. NUMINC must be an even number and a value of UMINC = 20 normally provides sufficient accuracy. In order to speed up the calculations, NUMINC can be reduced to a value as low as 10 without causing too great a change in the results. The use of values of NUMINC which are less than 10 is not recommended. NUMINC is read in with an I2 format and must be right justified in columns 3-4.

The overall format for this data group is (2I2) and all the data are contained on a single card. If NCALC = 1, the above data group is not read into the program.

If NVI = 2, the model must calculate a voltage-current curve. In this case, the following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) IFINAL is an indicator which causes the calculation of successive points on the voltage-current curve to cease after IFINAL points. This indicator allows the user to have the V-I calculation terminated at a point before the specified operating voltage is reached whenever it is taking an excessive number of points to reach the specified operating voltage. IFINAL is read in with an I2 format and must be right justified in columns 1-2.

(2) JI1 is an indicator which allows the initial increment size on current density in the calculation of the voltage-current curve to be changed after JI1-1 points are determined on the curve. Since the voltage-current calculation finds the applied voltage corresponding to a specified value of current density, this indicator allows the user to cover a large range of current densities without using an excessive number of points. JI1 is read in with an I2 format and must be right justified in columns 3-4.

(3) JI2 is an indicator which allows the second increment size on current density in the calculation of the voltage-current curve to be changed after JI2-1 points are determined on the curve. JI2 serves the same function as JI1 and JI2 must have a value greater than JI1 for proper usage. JI2 is read in with an I2 format and must be right justified in columns 5-6.

(4) VISKIP is an indicator which may have the values of 0 and 1. If VISKIP = 0, a voltage-current curve will be calculated up to a specified operating voltage for each successive length increment of the precipitator. If VISKIP = 1, only the operating current density which corresponds to a specified operating voltage will be calculated based on an estimation procedure discussed in Volume 1. In most cases, the user will want to set VISKIP = 1 since this will result in a prediction of the operating current density in each increment of length of the precipitator without using the large amounts of computer time required by the calculation of a voltage-current curve. Only extremely detailed analysis would warrant setting VISKIP = 0. VISKIP is read in with an I2 format and must be right justified in columns 7-8.

(5) VISAME is an indicator which may have the values of 1 and 2. The proper use of VISAME can result in significant savings in computer time whenever the applied voltage is the same in each electrical section. If the applied voltage is the same in each electrical section, set VISAME = 1 and only one "clean" voltage-current curve

will be calculated. If VISAME = 1, as many data sets as desired can be read into the program and all calculations will be based on the one "clean" voltage-current calculation. The use of VISAME = 1 is especially beneficial in studying hypothetical cases due to the large savings in computer time. If the applied voltage differs from one electrical section to the next, the user must set VISAME = 2. Whenever the operating voltage and current are unknown and the user must specify the use of the voltage-current calculations (NVI = 2), the quickest run time will occur when VISKIP = 1 and VISAME = 1. The longest run time will occur when VISKIP = 0 and VISAME = 2. VISAME is read in with an I2 format and must be right justified in columns 9-10.

The overall format for this data group is (5I2) and all data are contained on a single card. If NVI = 1, the above data group is not read into the program.

The following is a sequential listing of the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) DL is the inlet particulate mass loading in units of grains/ft^3. DL is read in with a F8.0 format and must be left justified in columns 1-8.

(2) PL is the total electrical length of the precipitator in units of feet. PL is read in with a F8.0 format and must be left justified in columns 9-16.

(3) ETA0 is the overall mass collection efficiency in units of percent and it has two different interpretations depending upon the value of NVI. If NVI = 1, ETA0 represents the measured or estimated overall mass collection efficiency and is used as a test for convergence in an iteration loop on overall mass collection efficiency. If NVI = 2, ETA0 simply represents the desired design efficiency and is not used in the calculations. ETA0 is read in with a F8.0 format and must be left justified in columns 17-24.

(4) DD is the density of the particles in units of kg/m^3. DD is read in with a F8.0 format and must be left justified in columns 25-32.

(5) EPS is the dielectric constant of the particles for use in the particle charging calculations and is dimensionless. Values of EPS must be equal to or greater than 1. In most industrial applications, the flue gas is sufficiently humidified so that the particle surface becomes conductive and a value of EPS = 100 can be used to simulate

a conductor. EPS is read in with a F8.0 format and must be left justified in columns 33-40.

(6) VRATIO is the ratio of the peak voltage to the average voltage and is dimensionless. In the calculation of particle charge, it is assumed that the particles will charge to an extent determined by the peak voltage rather than the average voltage. For industrial applications, VRATIO has a value around 1.2. VRATIO is read in with a F8.0 format and must be left justified in columns 41-48.

(7) US is the ionic mobility at standard temperature (273°K) and standard pressure (1 atm) and is in units of $m^2/(V\text{-}sec)$. This mobility is referred to as the "reduced mobility". Values to use for reduced ionic mobilities for flue gas compositions are not well-established at the present time. The reduced ionic mobility for air is in the range $1.2\text{-}2.1 \times 10^{-4} m^2/(V\text{-}sec)$. Reduced ionic mobilities for flue gas compositions have been reported that are considerably larger than those reported for air. These values cover the range of $2.2\text{-}5.4 \times 10^{-4} m^2/(V\text{-}sec)$. Some reported values of reduced ionic mobility for various gas compositions are given in Table 1. Since the ionic mobility has a strong influence on the electrical conditions through the current and electric field distributions, this is an important parameter in determining precipitator performance. A value of $3.0 \times 10^{-4} m^2/(V\text{-}sec)$ should provide a representative value to use for flue gases emanating from coal-fired boiler applications. US is read in with a F8.0 format and must be left justified in columns 49-56.

(8) FPATH is a parameter which is used in the field charging equation and is dimensionless. FPATH represents the number of ionic mean free paths over which the momentum of the ions will persist and allow the ions to reach the surface of the particle even though the saturation charge has been reached. The effect of this parameter is to increase the saturation charge. FPATH normally should have a value in the range 0-2. It is recommended that FPATH be assigned a value of 1. FPATH is read in with a F8.0 format and must be left justified in columns 57-64.

(9) EBD is the electrical breakdown strength of the gas or the particulate layer in the region near the plate and is in units of V/m. The value of this parameter is a strong function of the resistivity of the collected

TABLE 1

REDUCED EFFECTIVE NEGATIVE ION MOBILITIES FOR VARIOUS GAS COMPOSITIONS

Gas Composition (Volume Percent)					Reduced Effective Ion Mobility (cm^2/V-sec)
N_2	CO_2	O_2	SO_2	H_2O	
				100.0	0.67 ± 0.17[a]
		100.0			2.46 ± 0.06[b]
	100.0				1.08 ± 0.03[b]
			100.0		0.35[c]
	(Laboratory Air)				1.03[d]
	(Laboratory Air)				1.26 - 1.96[e]
79.4	14.7	4.6	0.2	0.6	5.39[f]
73.5	13.6	4.2	0.2	8.4	2.93[f]
65.9	12.2	3.8	0.2	17.8	2.23[f]
71.0	11.2	3.7	0.0	14.0	2.35[f]
75.7	11.6	3.2	0.0	9.4	3.02[f]
75.1	11.5	3.2	0.1	9.9	2.74[f]
78.5	10.9	3.6	0.0	7.0	3.36[f]
78.3	19.8	3.6	0.1	7.0	2.67[f]
77.9	10.8	3.6	0.3	7.0	2.70[f]
77.6	10.7	3.7	0.7	7.0	2.43[f]

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a. J. J. Lowke and J. A. Rees, Australian J. Phys. 16, 447 (1963).

b. E. W. McDaniel and H. R. Crane, Rev. Sci. Instru. 28, 684 (1959).

c. E. W. McDaniel and M. R. C. McDowell, Phys. Rev. 114, 1028 (1959).

d. B.Y.H. Liu, K. T. Whitby, and H.H.S. Yu, J. Appl. Phys. 38, 1592 (1967).

e. J. Bricard, M. Cabane, G. Modelaine, and D. Vigla, Aerosols and Atmospheric Chemistry. Edited by G. M. Hidy, New York, New York, 27 (1972).

f. H. W. Spencer, III, "Experimental Determination of the Effective Ion Mobility of Simulated Flue Gas." In Proceedings of 1975 IEEE-IAS Conference, September 28, 1975, Atlanta, Georgia.

particulate layer and the condition of the collection plates. At present, mathematical techniques which are based on physical principles do not exist for predicting the value of EBD under differing conditions. Thus, experimental data and prior experience must be used to choose appropriate values of EBD. In practical applications, EBD fails in the range of 2-15 kV/cm. A value of 2 kV/cm should provide a conservative estimate of EBD whereas a value of 15 kV/cm would in most cases provide the most optimistic value. The value of EBD is used whenever NVI = 2 and a voltage-current curve is generated. If the field at the plate exceeds the value of EBD at any point on the curve, a message to this effect is printed out with the V-I calculation terminating at the corresponding applied voltage and current density. These values of voltage and current are then used in the projection of precipitator performance. EBD is read in with a F8.0 format and must be right justified in columns 65-72.

(10) RHO is the resistivity of the collected particulate layer and is in units of ohm-cm. The resistivity to be used must be determined experimentally by either in situ or laboratory methods. RHO is used in the model only to estimate the average electric field in the collected particulate layer. It is not used to determine allowable electrical operating conditions. The effect of RHO on the allowable electrical operating conditions must be reflected in the input data for the operating voltages and currents. RHO is read in with a E8.2 format and must be right justified in columns 73-80.

The above data group has an overall format of (9F8.0, E8.2) and is contained on a single data card. This data set must be read in with each basic data set, i.e. when NDATA = 1.

The next data group which is read in depends on the value of NRAPD. If NRAPD is greater than 1, the following is a sequential listing of the variables in the next data group, along with the descriptions of the variables and the format specifications.

(1) ARD50(I) is an array containing the mass median diameters in μm for log-normal particle size distributions of the different rapping puff distributions which will be utilized in the model. The values of this variable are read in with a F4.0 format and must be left justified in columns 1-4, 9-12, 17-20, 25-28, 33-36, 41-44, 49-52, 57-60, 65-68, and 73-76.

(2) ARSIGM(I) is an array containing the geometric standard deviations for log-normal particle size distributions of the different rapping puff distributions which will

be utilized in the model. Values of ARD50(I) and ARSIGM(I) with the same index are used together to construct a log-normal particle size distribution. The values of this variable are read in with a F4.0 format and must be left justified in columns 5-8, 13-16, 21-24, 29-32, 37-40, 45-48, 53-56, 61-64, 69-72, and 77-80. ARSIGM(I) can not have a value less than 1.

The above variables must be read in for I=2 up to I=NRAPD where NRAPD can not exceed a value of 10. The overall format for this data group is (10(2F4.0)) and is contained on a single data card. If NRAPD=1, this data group is not read in. In this case, only one rapping puff particle size distribution will be considered where ARD50(1) = 6.0 in μm and ARSIGM(1) = 2.5. This case is built into the program and relates to experimental data discussed in Volume 1.

The following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) ASNUCK(I) is an array containing different fractions of gas flow which bypass the electrified region in each baffled stage of the precipitator and/or different fractions of the mass collected in each stage of the precipitator which are reentrained due to factors other than rapping. The values of this variable are read in with a F4.0 format and must be left justified in columns 1-4, 13-16, 25-28, 37-40, 49-52, and 61-64 of the first two data cards in the group and in columns 1-4, 13-16, and 25-28 of the third data card in the group. ASNUCK(I) must lie in the range 0.0 to 1.0.

(2) AZIGGY(I) is an array containing different normalized standard deviations for the inlet velocity distribution of the gas flow. The values of this variable are read in with a F4.0 format and must be left justified in columns 5-8, 17-20, 29-32, 41-44, 53-56, and 65-68 of the first two data cards in the group and in columns 5-8, 17-20, and 29-32 of the third data card in the group. AZIGGY(I) must be equal to or greater than 0.0.

(3) AZNUMS(I) is an array containing the number of baffled stages in the precipitator. The values of this variable are read in with a F4.0 format and must be left justified in columns 9-12, 21-24, 33-36, 45-48, 57-60, and 69-72 of the first two data cards in the group and in columns 9-12, 21-24, and 33-36 of the third data card in the group. The values of AZNUMS(I) must be whole numbers.

The values of ASNUCK(I), AZIGGY(I), and AZNUMS(I) with the same index are used together to simulate one set of nonideal parameters and to produce one set of no-rap efficiencies. The values of I are determined by NONID which must have a value of at least 1 and can not exceed a value of 15. Thus, at least one set of these parameters must be read in. It is recommended that the user take the first set of these variables to be ASNUCK(1) = 0.00, AZIGGY(1) = 0.00, and AZNUMS(1) = actual number of stages so that efficiencies under ideal conditions will be obtained. In practical situations, a well-operating precipitator will have values of ASNUCK and AZIGGY of approximately 0.1 and 0.25, respectively.

The overall format for this data group is (6(3F4.0)) and the data group is contained on 3 or less cards. For NONID $\leq$ 6, 6<NONID $\leq$ 12, and 12<NONID $\leq$ 15, the number of data cards necessary are 1, 2, and 3, respectively. This data group must be read in with each basic data set.

The next data group which is read in consists of a single array. The description of this array and its format specification are given below.

(1) ENDPT(I) is an array containing values of particle diameters corresponding to points on a curve of inlet mass cumulative percent versus particle diameter. The number of diameters that must be read in depends on the value of NENDPT which can not exceed a value of 21. The diameters must be inputted in order from smallest to largest in units of μm. The smallest diameter can not be less than 0.01 μm and the largest diameter can not exceed 1,000 μm. These diameters are used to construct particle size intervals and a particle size histogram. The midpoints between successive particle diameters constitute NENDPT-1 average particle diameters which are used in the program to characterize the different particle size bands. In constructing the particle diameters to be used in the calculations, it is recommended that greater resolution be built into the fine particle size range of 0.1-3.0 μm since the lower efficiencies are obtained in this size range. The values of ENDPT(I) are read in with a F8.0 format and must be left justified.

The overall format for this data group is (10F8.0) and the data group is contained on 3 or less data cards. For NENDPT $\leq$ 10, 10<NENDPT $\leq$ 20, and NENDPT = 21, the number of data cards necessary are 1, 2, and 3, respectively. This data group must be read in with each basic data set.

The next data group which is read in depends on the value of NDIST. If NDIST = 2, the following is a sequential listing of the variables in the next data group, along with the descriptions of the variables and the format specifications.

(1) D50 is the mass median diameter of a log-normal inlet particle size distribution and is in units of μm. The value of D50 must lie between 0.01 and 1,000 μm. The value of D50 is read in with a F8.0 format and must be left justified in columns 1-8.

(2) SIGMAP is the geometric standard deviation of a log-normal inlet particle size distribution and is dimensionless. The value of SIGMAP must be equal to or greater than 1. The value of SIGMAP is read in with a F8.0 format and must be left justified in columns 9-16.

The program uses the values of D50 and SIGMAP to construct a log-normal particle size distribution over the range and size bands determined by the values of ENDPT(I). Any mass which is not in the size range determined by ENDPT(I) will be put into the size band with the largest midpoint. This must be done to ensure that the sum over all size bands of the percentage of total mass in each size band will equal 100%.

The above data group has an overall format of (2F8.0) and is contained on a single data card. This data set is not read in if NDIST = 1.

If NDIST = 1, the next data group which is read in consists of a single array. The description of this array and its format specification are given below.

(1) PRCU(I) is an array containing values of cumulative percents corresponding to points on a curve of inlet mass cumulative percent versus particle diameter. The number of cumulative percents that must be read in depends on the value of NENDPT which can not exceed 21. The cumulative percents must match the particle diameters specified in the array ENDPT(I). The cumulative percents are inputted in units of %. The first value of PRCU(I) must be 0% and the last value must be 100%. The program determines the percentage by mass in each particle size band from the values contained in ENDPT(I) and PRCU(I). The user must supply values of PRCU(I) based on measured or known particle size information for the particular application under consideration. The values of PRCU(I) are read in with a F8.0 format and must be left justified.

The overall format for this data group is (10F8.0) and the data group is contained on 3 or less data cards. For NENDPT $\leq$ 10, 10<NENDPT $\leq$ 20, and NENDPT = 21, the number of data cards necessary are 1, 2, and 3, respectively. This data group is not read in if NDIST = 2.

The following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) NUMSEC is the number of electrical sections in the direction of gas flow. The value of this variable is read in with an I2 format and must be right justified in columns 1-2.

(2) LSECT(I) is an array containing values of the number of incremental lengths to be taken in each electrical section in the direction of gas flow. These values are determined by the user with increasing values of I corresponding to electrical sections moving from the inlet to the outlet of the precipitator. The maximum number of electrical sections which can be accounted for in the program listed in Volume 1 is 10 ($I \leq 10$). Also, the maximum total number of incremental lengths which can be taken is 45 ($\sum_{I} LSECT(I) \leq 45$). Procedures for increasing the number of electrical sections and incremental lengths are discussed in Section 5. The values of this variable are read in with an I2 format and must be right justified.

The overall format for this data group is (I2, 10I2) and the data group is contained on a single data card. This data group must be read in with each basic data set.

The following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) AS(NSECT) is the total collection plate area for a given electrical section and is in units of square feet. The values of this variable are read in with an E11.4 format and must be right justified in columns 1-11.

(2) VOS(NSECT) is the applied voltage in a given electrical section and is in units of volts. If NVI = 1, the value of VOS(NSECT) corresponds to a measured or known value. If NVI = 2, VOS(NSECT) corresponds to an applied voltage up to which a voltage-current curve will be calculated. Then, this applied voltage

along with the corresponding current will be used in the calculation of precipitator performance. The values of this variable are read in with an E11.4 format and must be right justified in columns 12-22.

(3) TCS(NSECT) is the total current in a given electrical section and is in units of amperes. If NVI = 1, the value of TCS(NSECT) corresponds to a measured or known value. If NVI = 2, TCS(NSECT) has no meaning in terms of input data since it will be calculated in the program. In this case, the appropriate columns on the data card can be left blank or any arbitrary number can be entered. The values of this variable are read in with an E11.4 format and must be right justified in columns 23-33.

(4) WLS(NSECT) is the total effective wire length in a given electrical section and is in units of feet. The values of this variable are read in with an E11.4 format and must be right justified in columns 34-44.

(5) ACS(NSECT) is the corona wire radius in a given electrical section and is in units of inches. The values of this variable are read in with an E11.4 format and must be right justified in columns 45-55.

(6) BS(NSECT) is the wire-to-plate spacing in a given electrical section and is in units of inches. The values of this variable are read in with an E11.4 format and must be right justified in columns 56-66.

(7) NWS(NSECT) is the number of discharge electrodes per given electrical section per gas passage and is dimensionless. The values of this variable normally should not exceed 20. If the values do exceed 20, use 20 in the program. These values are used to determine the number of terms in a series summation which determines the electrostatic electric field distribution and 20 terms are more than sufficient to reach convergence. The values of this variable are read in with an E11.4 format and must be right justified in columns 67-77.

(8) SYS(NSECT) is one-half of the wire-to-wire spacing in a given electrical section and is in units of inches. The values of this variable are read in with an E11.4 format and must be right justified in columns 1-11.

(9) VGS(NSECT) is the total gas volume flow rate in a given electrical section and is in units of actual ft^3/min. The values of this variable are read in with an E11.4 format and must be right justified in columns 12-22.

(10) VGASS(NSECT) is the gas velocity in a given electrical section and is in units of ft/sec. The values of this variable are read in with an E11.4 format and must be right justified in columns 23-33.

(11) TEMPS(NSECT) is the gas temperature in a given electrical section and is in units of °F. The values of this variable are read in with an E11.4 format and must be right justified in columns 34-44.

(12) PS(NSECT) is the gas pressure in a given electrical section and is in units of atmospheres. The values of this variable are read in with an E11.4 format and must be right justified in columns 45-55.

(13) VISS(NSECT) is the gas viscosity in a given electrical section and is in units of kg/(m-sec). Table 2 gives values of viscosity for different temperatures and water contents for a gas composition whose components are those of air. This table provides values of viscosity which cover most cases found in practice although some extrapolation is necessary for those cases involving hot precipitators where temperatures are greater than 300°C. The values of this variable are read in with an E11.4 format and must be right justified in columns 56-66.

(14) LINCS(NSECT) is the incremental length size which will be taken in a given electrical section and is in units of feet. If NVI = 1, LINCS(NSECT) should be given a value of approximately one foot although larger values can be used with some loss in accuracy in order to save computer run time. If NVI = 2, LINCS(NSECT) must be given a value equal as near as possible to the wire-to-wire spacing in order for the numerical procedure to be valid. In any case, the product of LSECT(NSECT) and LINCS(NSECT) must equal the total length of the given electrical section. The values of this variable are read in with an E11.4 format and must be right justified in columns 67-77.

The overall format for this data group is (7(E11.4)) and the data group is contained on two data cards. This data group must be read in with each basic data set.

TABLE 2. VALUES OF VISCOSITY FOR AIR AT VARIOUS TEMPERATURES AND WATER CONTENTS*

	Percent H_2O										
°C	0	1	2	3	4	5	6	7	8	9	10
10	1.767	1.758	1.748	1.739	1.730	1.721	1.712	1.702	1.693	1.684	1.675
20	1.810	1.801	1.792	1.783	1.774	1.765	1.755	1.746	1.737	1.728	1.719
30	1.854	1.844	1.835	1.826	1.817	1.808	1.799	1.790	1.780	1.771	1.762
40	1.900	1.887	1.878	1.869	1.860	1.850	1.841	1.832	1.823	1.814	1.805
50	1.938	1.929	1.920	1.911	1.902	1.892	1.883	1.874	1.865	1.856	1.847
60	1.979	1.970	1.961	1.952	1.943	1.934	1.925	1.916	1.907	1.898	1.888
70	2.020	2.011	2.002	1.993	1.984	1.975	1.966	1.957	1.948	1.939	1.930
80	2.059	2.050	2.042	2.033	2.024	2.015	2.006	1.997	1.988	1.979	1.970
90	2.099	2.090	2.081	2.072	2.063	2.054	2.046	2.037	2.028	2.019	2.010
100	2.137	2.129	2.120	2.111	2.102	2.093	2.085	2.076	2.067	2.058	2.049
110	2.175	2.167	2.158	2.149	2.140	2.132	2.123	2.114	2.105	2.097	2.088
120	2.213	2.204	2.195	2.189	2.178	2.169	2.161	2.152	2.143	2.135	2.126
130	2.250	2.241	2.232	2.224	2.215	2.207	2.198	2.189	2.181	2.172	2.164
140	2.286	2.277	2.269	2.260	2.252	2.243	2.235	2.226	2.218	2.209	2.201
150	2.321	2.313	2.304	2.296	2.288	2.279	2.271	2.262	2.254	2.245	2.237
160	2.356	2.348	2.339	2.331	2.323	2.315	2.306	2.298	2.289	2.281	2.273
170	2.390	2.382	2.374	2.366	2.358	2.349	2.341	2.333	2.325	2.316	2.308
180	2.424	2.416	2.408	2.400	2.392	2.383	2.375	2.367	2.359	2.351	2.343
190	2.457	2.449	2.441	2.433	2.425	2.417	2.409	2.401	2.393	2.385	2.377
200	2.489	2.482	2.474	2.466	2.458	2.450	2.442	2.434	2.426	2.418	2.410
210	2.521	2.513	2.506	2.498	2.490	2.482	2.475	2.467	2.459	2.451	2.443
220	2.552	2.545	2.537	2.530	2.522	2.514	2.507	2.499	2.491	2.483	2.476
230	2.583	2.575	2.568	2.560	2.553	2.545	2.538	2.530	2.523	2.515	2.507
240	2.613	2.606	2.598	2.591	2.583	2.576	2.569	2.561	2.554	2.546	2.539
250	2.642	2.635	2.628	2.621	2.613	2.606	2.599	2.592	2.584	2.577	2.570
260	2.671	2.664	2.657	2.650	2.643	2.636	2.628	2.621	2.614	2.607	2.600
270	2.699	2.692	2.685	2.678	2.671	2.664	2.657	2.650	2.643	2.636	2.629
280	2.727	2.720	2.713	2.706	2.700	2.693	2.686	2.679	2.672	2.665	2.658
290	2.754	2.747	2.740	2.734	2.727	2.720	2.714	2.707	2.700	2.694	2.687
300	2.780	2.773	2.767	2.761	2.754	2.748	2.741	2.734	2.728	2.721	2.715

X 10^{-5} kg/(m-sec)

*Calculations according to:
C.R. Wilke. A Viscosity Equation for Gas Mixtures. J. Chem. Phy., 18(4):517-519 (April, 1950).

The next data group which is read in depends on the value of NVI. If NVI = 2, the following is a sequential listing of the variables in the next data group which is read in, along with the descriptions of the variables and the format specifications.

(1) RFS(NSECT) is the roughness factor for the wires in a given electrical section and is dimensionless. In precipitation practice, if the wires are scratched or dirty but not completely coated with air, then the values of RFS(NSECT) lie in the range 0.5-1.0. A value of 1.0 corresponds to wires which are in perfect condition. The effect of decreasing the roughness factor is one of increasing the current that can be achieved at a given voltage level. If the wires are completely covered with dirt, then the effect may be one of increased wire diameter with a roughness superimposed. This situation would lead to compensating effects. The values of this variable are read in with an E11.4 format and must be right justified in columns 1-11.

(2) START1(NSECT) is the chosen initial current density at which the calculation of a voltage-current curve starts in a given electrical section and is in units of A/m^2. In generating the voltage-current curve, the current density increments in steps of START1 (NSECT) until a change is specified. The values of this variable are read in with an E11.4 format and must be right justified in columns 12-22.

(3) START2(NSECT) is a chosen increment in current density which is used in place of START1(NSECT) when the JI1-th point on the voltage-current curve is reached and is in units of A/m^2. The values of this variable are read in with an E11.4 format and must be right justified in columns 23-33.

(4) START3(NSECT) is a chosen increment in current density which is used in place of START2(NSECT) when the JI2-th point on the voltage-current curve is reached and is in units of A/m^2. The values of this variable are read in with an E11.4 format and must be right justified in columns 34-44.

(5) VSTAR(NSECT) is an estimate of the applied voltage corresponding to the first point on the voltage-current curve as defined by START1(NSECT) and is in units of volts. If VSTAR(NSECT) is close to the actual applied voltage, the calculation will be performed faster. However, whatever the choice of VSTAR (NSECT), it will not affect the accuracy of the

calculation. The values of this variable are read in with an E11.4 format and must be right justified in columns 45-55.

The overall format for this data group is (7(E11.4)) and the data group is contained on a single data card. If NVI = 1, this data group is not read in.

The data input starting with AS(NSECT) above must be repeated for each electrical section of the precipitator, proceeding from the inlet to the outlet of the precipitator. Thus, the data group containing AS(NSECT) and possibly the data group containing RFS(NSECT) must be read in NUMSEC different times.

At this point, the basic data set has been entered into the program and precipitator performance will be projected based on the inputted data. The last card in the data section must have a 99 in columns 1-2. This causes the program to terminate normally.

CONSTRUCTION OF SHORTENED DATA SETS

Once the basic data set is processed, then all the parameters which are needed by the program to calculate precipitator performance are stored in memory. By using values of NDATA equal to 2, 3, or 4, shortened data sets can be entered after the basic data set in order to analyze the effects of particle size distribution, specific collection area, and electrical conditions on precipitator performance. In the shortened data sets, the values of a small number of variables which are stored in memory are changed to new values in order to produce a new set of data.

In each shortened data set, the first two data groups and data cards which are read in are the same as those discussed for the basic data set. The value of NDATA on the first data card determines the variables in memory that will be changed. The effects of particle size distribution on precipitator performance can be analyzed by setting NDATA = 2. In this case, the third data group which is read in depends upon the value of NDIST which is stored in memory. If NDIST = 2, an inlet mass median diameter (D50) and geometric standard deviation (SIGMAP) must be read in according to the same specifications discussed for the basic data set. If NDIST = 1, cumulative percents (PRCU(I)) corresponding to the particle sizes (ENDPT(I)) stored in memory must be read in according to the same specifications discussed for the basic data set. After the third data group is read in, the shortened data set is complete. By repeating this type of shortened data with different choices of D50 and SIGMAP or PRCU(I), the effects of particle size distribution can be analyzed with the use of only a few data cards.

The effects of specific collection area (SCA) on precipitator performance can be analyzed by setting NDATA = 3. In this case,

the following is a sequential listing of the variables which are inputted in the third data group, along with the descriptions of the variables and the format specifications.

(1) VGS(I) is the total gas volume flow rate in a given electrical section and is in units of actual ft^3/min. The values of this variable are read in with an E11.4 format and must be right justified in columns 1-11, 23-33, and 45-55.

(2) VGASS(I) is the gas velocity in a given electrical section and is in units of ft/sec. The values of this variable are read in with an E11.4 format and must be right justified in columns 12-22, 34-44, and 56-66.

The overall format for this data group is (3(2E11.4)) and the data group is contained on 4 or less cards depending on the value of NUMSEC which is stored in memory. For NUMSEC $\leq$ 3, 3<NUMSEC $\leq$ 6, 6<NUMSEC $\leq$ 9, and NUMSEC = 10, the number of data cards necessary are 1, 2, 3, and 4, respectively.

After this data group is read in, the shortened data set is complete. By repeating this type of shortened data set with different choices of VGS(I) and VGASS(I), the effects of specific collection area can be analyzed with the use of only a few data cards.

The effects of applied voltage and current on precipitator performance can be analyzed by setting NDATA = 4. In this case, the following is a sequential listing of the variables which are inputted in the third data group, along with the descriptions of the variables and the format specifications.

(1) VOS(I) is the applied voltage in a given electrical section and is in units of volts. If the value of NVI stored in memory is 1, the value of VOS(I) corresponds to a measured or known value. If the value of NVI stored in memory is 2, VOS(I) corresponds to an applied voltage up to which a voltage-current curve will be calculated. Then, this applied voltage along with the corresponding current will be used in the calculation of precipitator performance. The values of this variable are read in with an E11.4 format and must be right justified in columns 1-11, 23-33, and 45-55.

(2) TCS(I) is the total current in a given electrical section and is in units of amperes. If the value of NVI stored in memory is 1, TCS(I) corresponds to a measured or known value. If the value of NVI stored in memory is 2, TCS(I) has no meaning in

terms of input data since it will be calculated in the program. In this case, the appropriate columns on the data cards can be left blank or any arbitrary number can be entered. The values of this variable are read in with an E11.4 format and must be right justified in columns 12-22, 34-44, and 56-66.

The overall format for this data group is (3(2E11.4)) and the data group is contained on 4 or less cards depending on the value of NUMSEC which is stored in memory. For NUMSEC $\leq$ 3, 3<NUMSEC $\leq$ 6, 6<NUMSEC $\leq$ 9, and NUMSEC = 10, the number of data cards necessary are 1, 2, 3, and 4, respectively.

After this data group is read in, the shortened data set is complete. By repeating this type of shortened data set with different choices of VOS(I) and TCS(I), the effects of voltage and current can be analyzed with the use of only a few data cards.

By using the shortened data sets in different combinations and in a judicious order, much information can be generated with only a relatively few number of cards. Figure 1 contains a flow-chart which shows the logic involved in inputting the data and the data that are read in.

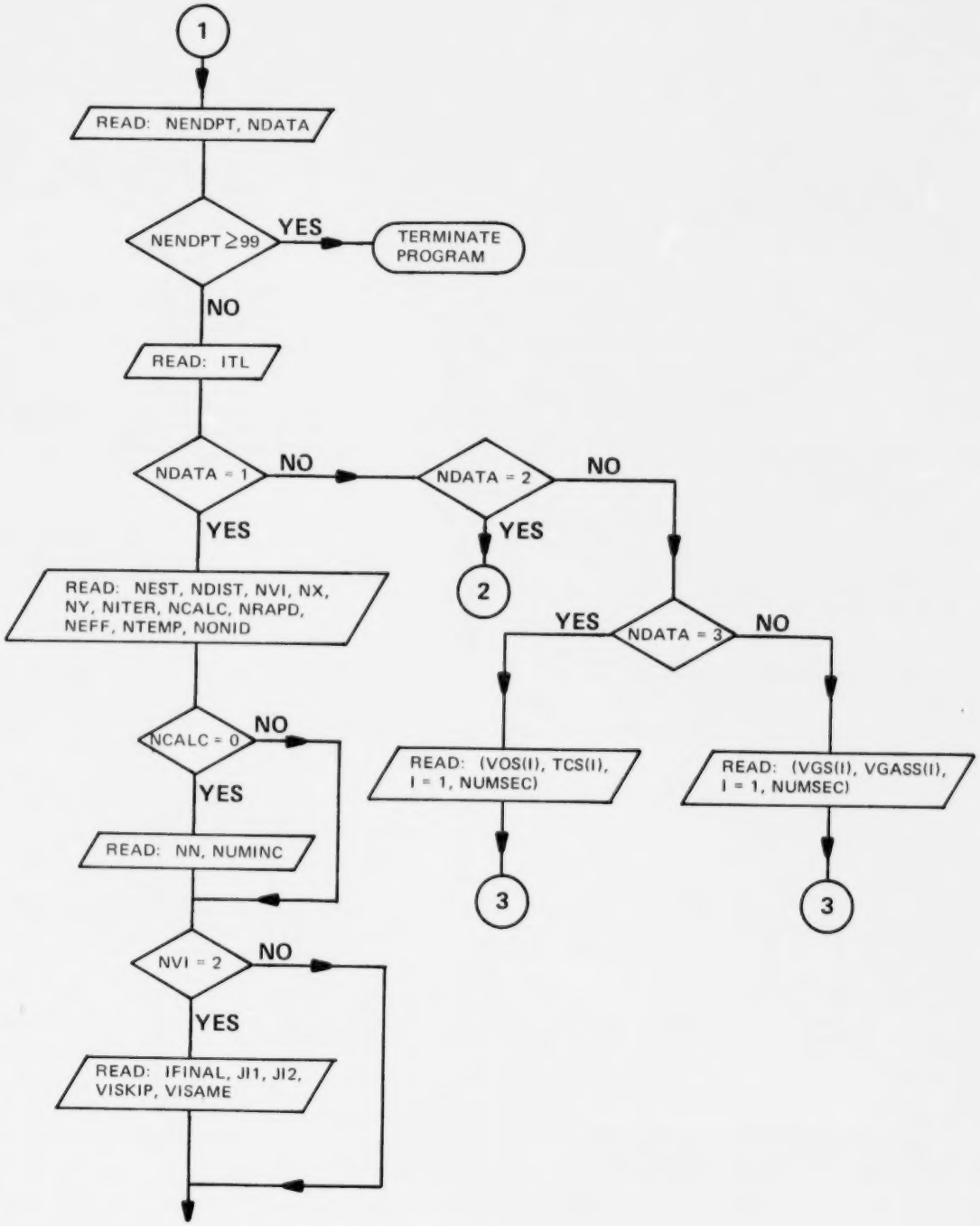

Figure 1. Flow chart for the input data logic (Sheet 1 of 2).

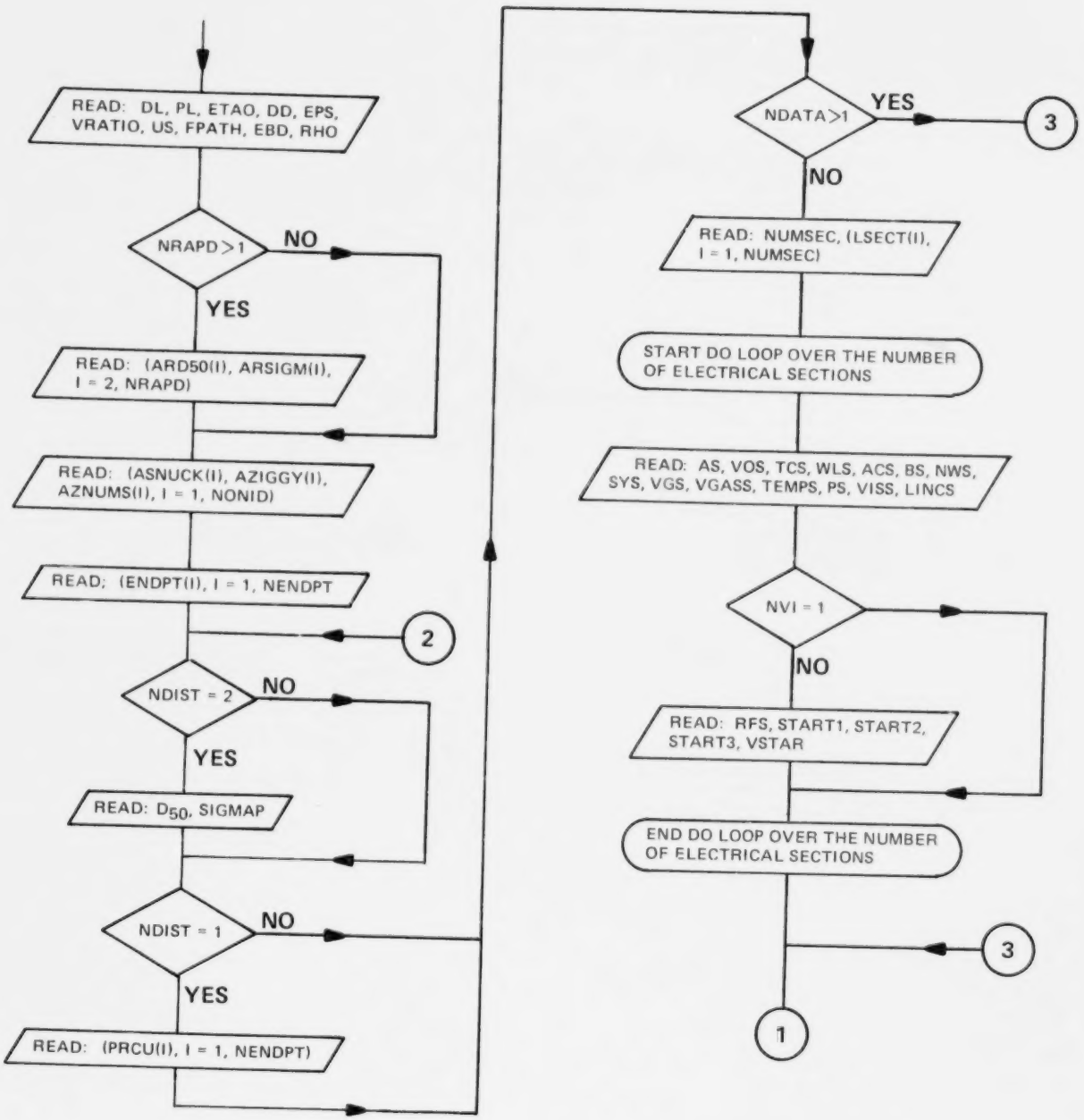

Figure 1. Flow chart for the input data logic (Sheet 2 of 2).

SECTION 4

DESCRIPTION OF OUTPUT DATA

GENERAL DESCRIPTION

The output data from the computer program are divided into seven sections. The types of information contained in the different sections are listed in order below.

(1) Printout of all input data.

(2) Incremental analysis of precipitator performance.

(3) Charging rates for the different particle sizes.

(4) Charge accumulated on the different particle sizes.

(5) Particle size range statistics.

(6) Unadjusted migration velocities and collection efficiencies and discrete outlet mass loadings.

(7) Summary table of precipitator operating parameters and performance.

In the following subsections, the information contained in the different sections listed above will be described in detail.

PRINTOUT OF INPUT DATA

The first section of printout which is generated in subroutine PRTINP contains a listing of all the input data. The first piece of information which is printed out in this section is a description of the organizations involved in the development of the model and the date of the latest revision. The second piece of information which is printed out is a statement identifying the data set number. Next, in sequence, each input data card number is printed out and is followed by a sequential list of the data entries on that particular card. The individual data entries are printed out in terms of the variable name, numerical value, and input units.

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

This section of output data which is generated in subroutine PRTINC provides a printout of those parameters of importance which vary along the length of the precipitator. This includes data which change from one electrical section to the next and from one increment of length to the next.

The first piece of information which is printed out in this section is the inputted information that describes the particular calculation being performed. Second, the section number and section length (m) are printed out.

Third, the names, values, and units of those parameters of importance which may be section-dependent are printed out in three columns. Most of this information is mainly of interest in debugging the model and in looking for problems with the model. The first column contains the following variables in the designated order:

(1) total collection plate area in a given section in units of m^2;

(2) wire-to-wire spacing in units of m;

(3) current per meter of wire in units of A/m;

(4) one-half the wire-to-wire spacing in units of m;

(5) gas temperature in units of °K;

(6) actual gas ion mobility in units of $m^2/(V\text{-sec})$; and

(7) the mass flux (DUST WEIGHT) entering the precipitator based on the gas volume flow in the given section in units of kg/sec.

The second column contains the following variables in the designated order:

(1) applied voltage in units of volts;

(2) corona wire radius in units of m;

(3) current density in units of A/m^2 where the printed value corresponds to a measured or known value (dirty gas) for NVI = 1 and to a calculated clean gas value for NVI = 2;

(4) gas volume flow rate in units of m^3/sec;

(5) gas pressure in units of atm;

(6) mean thermal speed of the gas ions in units of m/sec; and

(7) size of length increments to be taken in the given section in m.

The third column contains the following variables in the designated order:

(1) total current in a given section in units of A where the printed value corresponds to a measured or known value (dirty gas) for NVI = 1 and to a calculated clean gas value for NVI = 2;

(2) total effective corona wire length in a given section in units of m;

(3) average electric field in the deposited dust layer in units of V/m;

(4) gas velocity in units of m/sec;

(5) gas viscosity in units of kg/(m-sec);

(6) ionic path length over which the momentum of the ion persists in the calculation of particle charge due to field charging in units of m; and

(7) overall mass efficiency per increment in units of % based on an estimated or measured efficiency for NVI = 1 or the inputted design efficiency for NVI = 2.

Fourth, those parameters of importance which depend on a particular length increment are printed out in a table. The table contains 11 columns and a number of rows equal to the number of length increments in the given section. The following is a sequential list of the column headings, along with their descriptions.

(1) ROVRI(RIOVR) is the ratio of the total charge density to the ionic charge density and is dimensionless. ROVRI is printed out when NVI = 1. If NVI = 2, RIOVR is printed out. RIOVR is the ratio of the ionic charge density to the total charge density and is dimensionless.

(2) ERAVG is the average electric field in units of V/m. If NVI = 1, ERAVG is determined by dividing the applied voltage by the wire-to-plate spacing. If NVI = 2, ERAVG is determined by averaging the electric field over the 2NY-2 strips which are contained in a wire-to-wire spacing and are established by the grid use in the calculation of the electrical conditions.

(3) EPLT — is the average electric field at the plate in units of V/m.

(4) AFID — is the average free ion density available for particle charging in units of $\#/m^3$.

(5) CMCD — is the average current density at the plate in units of nA/cm^2.

(6) MMD — is the mass median diameter of the collected material in units of m.

(7) WEIGHT — is the amount of material collected in units of kg/m^3 gas.

(8) DUST LAYER — is the thickness of the collected particulate layer in units of mm/min.

(9) J(PART) — is the average current density at the plate due to particles in units of A/m^2.

(10) J(ION) — is the average current density at the plate due to ions in units of A/m^2.

(11) INCR.NO. — is the increment number for which the calculations have been made.

The data output beginning with the section number and section length and ending at the present point is repeated for each section of the precipitator. After the data concerning the last section are printed out, the estimated or design efficiency and the uncorrected computed efficiency are printed out. If NVI = 1, the incremental analysis of precipitator performance along with its associated printout will be repeated until either the value of NITER is reached or the uncorrected computed efficiency is within 0.05% of the estimated efficiency.

If NVI = 2, the printout of output data discussed above will be altered somewhat in order to display data concerning the voltage-current calculations. If VISAME = 2 and VISKIP = 2, then, before the data concerning each section is printed out, the clean gas voltage-current density-field at the plate relationship will be printed out and will be preceded by a heading to that effect. The variables VW, ACDNTY, and AEPLT which are the applied voltage (V), average current density at the plate (A/m^2), and average electric field at the plate (V/m), respectively, will be printed out in columns. Also, before the data concerning each length increment is printed out, the dirty gas voltage-current density-field at the plate relationship will be printed out and will be preceded by a heading to that effect. The variables VW, ACDNTY, and AEPLT will be displayed as discussed above.

If VISAME = 1 and VISKIP = 2, the printout will be the same as for VISAME = 2 and VISKIP = 2 except that the clean gas voltage-current density-field at the plate relationship will be printed out only prior to the data concerning the first section. If VISAME = 2 with VISKIP = 1 or NEST = 2, the printout will be the same as for VISAME = 2 and VISKIP = 2 except that the dirty gas voltage-current density-field at the plate relationship will not be printed out prior to each incremental length. If VISAME = 1 with VISKIP = 1 or NEST = 2, the printout will be the same as for NVI = 1 except that the clean gas voltage-current density-field at the plate relationship will be printed out prior to the data concerning the first section.

CHARGING RATES FOR THE DIFFERENT PARTICLE SIZES

This section of output data which is generated in subroutine CHGSUM begins by stating the method by which particle charges were determined. Next, a table is printed out which contains, for each particle size, values of the ratio of the charge accumulated by a given particle size through a given increment of travel to the saturation charge in the last section. The number of columns in the table is determined by the number of particle size bands in the inlet particle size histogram and the number of rows is determined by the number of increments into which the precipitator has been divided. The column headings are the actual values of the midpoints of the size bands in units of μm and the row headings are the increment numbers. The entries in the table are designated by Q/QSATF.

CHARGE ACCUMULATED ON THE DIFFERENT PARTICLE SIZES

This section of output data which is generated in subroutine CHGSUM consists of a table which contains, for each particle size, the values of the charge in coulombs accumulated by a given particle size through a given increment of travel. The number of columns in the table is determined by the number of particle size bands in the inlet particle size histogram and the number of rows is determined by the number of increments into which the precipitator has been divided. The column headings are the actual values of the midpoints of the size bands in units of μm and the row headings are the increment numbers.

PARTICLE SIZE RANGE STATISTICS

This section of printout is generated in subroutine ADJUST. The data output in this section begins by stating which set of values of ASNUCK(I), AZIGGY(I), and ZNUMS(I) is under consideration. Next, a table is printed out which contains information of importance which is dependent on particle size. This table has 11 columns and the number of rows is determined by the number of particle size bands in the inlet particle size histogram. The column headings and their descriptions are given in order below.

(1) SIZE — is the midpoint of a particle size band in units of μm.

(2) CCF — is the Cunningham correction factor for a given particle size and is dimensionless.

(3) INLET % — is the percentage by mass of a given particle size band in the inlet particle size distribution in units of %.

(4) OUTLET % — is the percentage by mass of a given particle size band in the no-rap outlet emissions in units of %.

(5) COR. OUTLET % — is the percentage by mass of a given particle size band in the rap + no-rap outlet emissions in units of %.

(6) NO-RAP EFF. — is the collection efficiency for a given particle size band under no-rap conditions in units of %.

(7) NO-RAP W — is the effective migration velocity for a given particle size band under no-rap conditions in units of cm/sec.

(8) NO-RAP P — is the penetration of a given particle size band under no-rap conditions in units of %.

(9) COR. EFF. — is the collection efficiency for a given particle size band under rap + no-rap conditions in units of %.

(10) COR. W — is the effective migration velocity for a given particle size band under rap + no-rap conditions in units of cm/sec.

(11) COR. P — is the penetration of a given particle size band under rap + no-rap conditions in units of %.

Next, 17 (or 18 if NDIST = 1) lines of data are printed out which contain information regarding overall mass efficiency, precipitation rate parameter, and particle size distribution under various conditions. In the following, a sequential listing of this information is presented and discussed.

• The stated and uncorrected computed efficiencies are printed on this line. If NVI = 1, the stated efficiency corresponds to the last estimated overall mass efficiency used in the calculations. If NVI = 2, the stated efficiency corresponds to the inputted design efficiency. The computed efficiency is the uncorrected ideal overall mass collection efficiency. Also, the words "convergence obtained" are printed out to indicate that the calculation over incremental lengths has been completed.

• The overall adjusted no-rap efficiency in units of % is printed out on this line. This efficiency is obtained by taking the uncorrected ideal migration velocities and correcting them for gas sneakage and/or non-rapping particle reentrainment, gas velocity distribution, and empirical no-rap correction factors in order to determine adjusted no-rap migration velocities. Adjusted no-rap efficiencies are calculated from the corresponding migration velocities and these are used to determine the overall adjusted no-rap efficiency.

• The mass median diameter of the inlet particle size distribution in units of μm is printed out on this line.

• The geometric standard deviation of the inlet particle size distribution is printed out on this line.

• If NDIST = 1, the MMD and σ_p were obtained from a log-normal fit of the inlet particle size distribution and the goodness of fit (GFIT) is printed out on this line. A value of 1 indicates a perfect fit whereas values less than 1 indicate the extent to which the distribution deviates from a log-normal distribution. If the goodness of fit is much less than 1, the distribution deviates significantly from a log-normal distribution and the values for the MMD and σ_p obtained from the fitting procedure may not be meaningful with respect to the actual distribution. Thus, when the MMD and σ_p are of importance, the user must take care in examining the goodness of fit and comparing the fitted MMD and σ_p with the actual distribution. Values of $(GFIT)^2 > 0.985$ are sufficient to justify using a log-normal fit for many purposes. If NDIST = 1, a true log-normal distribution is used based on a MMD and σ_p which are inputted and this line of printout is omitted.

• The mass median diameter of the outlet particle size distribution under no-rap conditions in units of μm is printed out on this line.

• The geometric standard deviation of the outlet particle size distribution under no-rap conditions is printed out on this line.

• The log-normal goodness of fit for the outlet particle size distribution under no-rap conditions is printed out on this line. As before, care must be taken in interpreting the MMD and σ_p and their meaningfulness must be judged in terms of the goodness of fit and the actual size distribution.

• The precipitation rate parameter under no-rap conditions in units of cm/sec is printed out on this line. This quantity is determined by using the adjusted no-rap efficiency in the exponential-type equation relating efficiency and migration velocity and solving for the migration velocity.

• The values of the chosen nonideal conditions of normalized standard deviation of the gas velocity distribution, fraction of

gas bypassage and/or non-rapping particle reentrainment per stage, and the number of stages are printed out on this line.

- The value of the indicator NTEMP is printed out on this line in order to indicate whether the rapping loss calculation is for a hot or cold side precipitator.

- The mass median diameter of the rapping puff size distribution (RMMD) in units of μm is printed out on this line.

- The geometric standard deviation of the rapping puff size distribution (RSIGMA) is printed out on this line.

- The final corrected overall mass collection efficiency in units of % which includes rapping losses is printed out on this line.

- The final corrected mass median diameter of the outlet particle size distribution under rap + no-rap conditions in units of μm is printed out on this line.

- The final corrected geometric standard deviation of the outlet particle size distribution under rap + no-rap conditions is printed out on this line.

- The log-normal goodness of fit for the outlet particle size distribution under rap + no-rap conditions is printed out on this line. As before, care must be taken in interpreting the MMD and σ_p and their meaningfulness must be judged in terms of the goodness of fit and the actual size distribution.

- The precipitation rate parameter under rap + no-rap conditions in units of cm/sec is printed out on this line. This quantity is determined by using the final corrected overall mass efficiency in the exponential-type equation relating efficiency and migration velocity and solving for the migration velocity.

UNADJUSTED MIGRATION VELOCITIES AND DISCRETE OUTLET MASS LOADINGS

This section of output data which is generated in subroutine ADJUST consists of a table which contains information for each particle size band concerning the unadjusted migration velocity and collection efficiency and the outlet mass loadings. The table has 7 columns and a number of rows which is equal to the number of particle size bands. The following is a sequential listing of the column headings which contains descriptions of the output variables.

IDEAL UNADJUSTED

(1) MIG. VEL. (CM/SEC) is a column containing the ideal uncorrected migration velocity for each particle size band. These values are obtained from the ideal calculation of particle collection efficiency and contain no empirical adjustments.

IDEAL UNADJUSTED

(2) EFFICIENCY % is a column containing the ideal uncorrected collection efficiency for each particle size band.

NO-RAP

(3) DM/DLOGD(MG/DSCM) is a column containing the discrete mass loading in each size band under no-rap conditions. The discrete mass loading for a given particle size band is determined by calculating $\Delta M/\Delta \log_{10} D$, using the NO-RAP outlet particle size distribution and the total NO-RAP outlet mass loading where ΔM is the mass loading in the size band in units of mg/DSCM and $\Delta \log_{10} D$ is the difference of the $\log_{10}$ of the particle diameter in units of m at the upper endpoint of the size band and the lower endpoint.

RAPPING PUFF

(4) DM/DLOGD/(MG/DSCM) is a column containing the discrete mass loading in each size band for the rapping puff (contribution due to rapping). The discrete mass loading for a given size band is determined as discussed above using the rapping puff particle size distribution and the mass loading for the rapping puff.

NO-RAP+RAP PUFF

(5) DM/DLOGD(MG/DSCM) is a column containing the outlet discrete mass loading in each size band under no-rap + rap conditions. The discrete mass loading for a given size band is determined as discussed above using the no-rap + rap outlet particle size distribution and the total no-rap + rap outlet mass loading.

RAPPING PUFF

(6) DISTRIBUTION (%) is a column containing the percentage by mass of each particle size band in the rapping puff. This distribution is log-normal and is constructed based on a specified MMD and σ_p.

PARTICLE

(7) DIAM. (M) is a column containing the midpoint of each particle size band.

SUMMARY TABLE OF PRECIPITATOR OPERATING PARAMETERS AND PERFORMANCE

This section of output data which is generated in subroutine PRTSUM consists of a table which summarizes the results of the calculations and gives the values of the most important parameters. The table is divided into five types of information: (1) data set number, (2) ESP performance, (3) electrical conditions, (4) size distributions, and (5) nonideal parameters.

The data set number is the number of the particular set of nonideal conditions which is under consideration. Under ESP performance, the no-rap + rap efficiency (%) and specific collection area [$m^2/(m^3/sec)$] are printed out. Under electrical conditions, the average applied voltage (V), average current density (nA/cm^2), and resistivity are printed out. Under size distributions, the MMD (μm) and σ_p for the inlet and outlet particle size distributions are printed out. The outlet MMD and σ_p are based on no-rap + rap conditions. Under nonideal parameters, the gas sneakage fraction per section, the normalized standard deviation of the gas velocity distribution and the MMD and σ_p of the rapping puff are printed out.

SECTION 5

MACHINE-DEPENDENT ASPECTS OF THE COMPUTER PROGRAM

The computer program, presented and discussed in this report, has been developed on a Digital Equipment Corporation (DEC) PDP 15/76 computer. By changing only two statements, the program has been executed successfully on an IBM 370/158 computer and on a UNIVAC 1100 computer. By changing the same two statements and certain output formating, the program has been executed successfully on a Control Data Corporation (CDC) 7600 computer. Although the program should compile successfully with only minor changes on most computers with a FORTRAN compiler, there are certain machine-dependent aspects of the program that should be discussed. These machine-dependent properties can be utilized to make the usage of the program more general and to extend the application of the program.

In order to use the program on most computers, the first two executable statements in the program must be changed. These statements define the input (read) and output (write) unit numbers. The value of the variable NREAD specifies the input unit number and the value of NPRNT specifies the outlet unit number. These two changes should normally be all the modifications which are necessary to allow successful compilation of the program. However, in order to execute the program on the CDC 7600 computer, it was also necessary to change single quotes to double quotes in output format statements. The approximate times required to compile the entire program on the DEC PDP 15/76, IBM 370/158, UNIVAC 1100, and CDC 7600 computers were 1575, 51, 95, and 5 seconds, respectively. Although these times can not be compared directly due to software differences and the fact that an overlay was necessary on the DEC PDP 15/76, they do give some indication of the relative compile times.

Once the program is compiled, it will execute provided that enough core is available to store the program. The total core requirements on the DEC PDP 15/76 are 86,334 octal words (36,060 decimal words) for the program plus 10,276 octal words (4,286 decimal words) for system software necessary to implement the program. Table 3 lists the various segments of the program and their core requirements.

TABLE 3. CORE REQUIREMENTS FOR VARIOUS SEGMENTS OF THE COMPUTER PROGRAM

	Octal Words	Decimal Words
RESIDENT CODE		
ESPM	11,113	4,683
CMAN	573	379
BLK1	502	322
BLK2	62	50
BLK3	16	14
BLK4	1	1
BLK5	15	13
BLK6	1,354	748
BLK7	3,410	1,800
BLK8	170	120
BLK9	74	60
BLK10	74	60
BLK11	53	43
BLK12	202	130
BLK13	702	450
BLK14	3	3
BLK15	71	57
BLK16	5	5
BLK17	2	2
BLK18	17	15
BLK19	57	47
BLK20	263	179
System Software	7,515	3,917

	Octal Words	Decimal Words
LINK1		
SPCHG1	407	263
EFLD1	13,663	6,607
LINK2		
SPCHG2	732	474
EFLD2	15,774	7,164
LINK3		
ADJUST	7,156	3,694
WADJST	610	392
CFIT	467	311
LNFIT	616	398
QTFE	160	112
LNDIST	1,567	887
PRTSUM	1,540	864
System Software	437	287
LINK4		
CHARGN	343	228
RATE	1,244	676
ARCCOS	200	128
ZERO	130	88
System Software	12	10
LINK5		
PRTINC	1,744	996
PRTCHG	1,562	882
PRTINP	5,113	2,635
CHGSUM	1,115	621
System Software	110	72

Due to the fact that the particular DEC PDP 15/76 which has been used to develop the program has only approximately 55,714 octal words (23,500 decimal words) of core that can be accessed at any given time, it was necessary to overlay subroutines in order to fit the program into core. The main program (ESPM) and subroutine CMAN were kept in resident core and the overlay was established by setting up the following five links:

LINK1 = SPCHG1, EFLD1

LINK2 = SPCHG2, EFLD2

LINK3 = ADJUST, WADJST, CFIT, LNFIT, QTFE, LNDIST, PRTSUM

LINK4 = CHARGN, RATE, ARCCOS, ZERO

LINK5 = PRTINC, PRTCHG, PRTINP, CHGSUM

With the above overlay, the required core is 55,633 octal words (23,451 decimal words) including system software. The core requirements were determined by the core utilized in resident core and the largest link (LINK2). In this particular overlay, LINK2 had 4,707 octal words (2,503 decimal words) of core which were not utilized. Also, the link table required an additional 323 octal words (211 decimal words) of core.

In order to get the program to execute on computers with small storage capacities, an overlay similar to the one discussed above may be possible. On computers with large memories such as the IBM 370/158, UNIVAC 1100, or CDC 7600, no such action is necessary.

Without changing the fundamental operations of the program, the dimensions of certain arrays can be decreased or increased if necessary. The dimensions of these arrays may be decreased in order to fit the program on a small computer or they may be increased to give greater flexibility on a large computer. In the version of the program presented in this report, the following quantities determine array sizes which may be changed:

- number of increments along the length of the precipitator
- number of particle size bands
- number of electrical sections in the direction of gas flow
- number of grid points used in the calculations of electrical conditions
- number of rapping puff particle size distributions

- number of sets of nonideal conditions of nonuniform gas velocity distribution and gas sneakage and/or particle reentrainment without rapping.

The above quantities have maximum values of 45, 20, 10, 225, 10, and 15, respectively.

The number of increments along the length of the precipitator that can be utilized can be changed by changing the dimension of DW and the dimension of the first subscript of XDC. DW appears in COMMON/BLK6/ and XDC appears in COMMON/BLK7/. COMMON/BLK6/ appears in the main program and subroutines PRTINP, CHGSUM, PRTINC, PRTCHG, ADJUST, and PRTSUM. COMMON/BLK7/ appears in the main program and subroutines SPCHG2 and PRTCHG. DW also appears in the dimension statement in the subroutine SPCHG1. If the storage capacity of the computer is large enough, the program should be modified to handle more than 45 increments. Although 120 increments should be sufficient to handle most cases, as many as 180 increments may be necessary in certain cases.

The number of particle size bands that can be utilized can be changed by changing the dimension of CHKSUM, DIAM, ONO, DXS, XMV, PCNT, RAD, CCF, VOL, XNO, Q, WS, QSAT, OLDQ, OLDXNO, XDC, OLDQF, OLDQT, SOLDQF, SOLDQT, YY, RPCNT, DMDLD, WUNCOR, RDMDLD, CDMDLD, PCTOT, CPCTOT, WSL, PXS, EUNCOR, and AREA. In addition, changes must be made to those variables which depend on the number of particle diameters in the particle size histogram. These variables must have a dimension which is a value of 1 greater than those which depend on the number of size bands. These variables include PRCU, ENDPT, PRCUNR, RPRCU, PRCUC, Z, and Y. CHKSUM appears in the dimension statement in the main program. DIAM, ONO, DXS, XMV, PCNT, RAD, CCF, and PRCU appear in COMMON/BLK1/. VOL, XNO, Q, WS, QSAT, OLDQ, AND OLDXNO appear in COMMON/BLK6/. XDC appears in COMMON/BLK7/. ENDPT appears in COMMON/BLK11/. OLDQF, OLDQT, SOLDQF, and SOLDQT appear in COMMON/BLK20/. COMMON/BLK1/ appears in the main program and subroutines PRTINP, PRTCHG, and ADJUST. COMMON/BLK6/ and COMMON/BLK7/ appear in those locations previously designated. COMMON/BLK11/ appears in the main program and subroutines PRTINP, ADJUST, LNFIT, and LNDIST. COMMON/BLK20/ appears in the main program and subroutine CHGSUM. QSAT and XNO appear in the dimension statement in subroutine SPCHG1. XNO, RAD, CCF, OLDQ, and Q appear in the dimension statement in subroutine SPCHG2. YY appears in the dimension statement in subroutine PRTCHG. RPCNT, DMDLD, WUNCOR, RDMDLD, CDMDLD, PCTOT, CPCTOT, WSL, PXS, PRCUNR, RPRCU, PRCUC, and EUNCOR appear in the dimension statement in subroutine ADJUST. DIAM, ONO, and PXS appear in the dimension statement in subroutine WADJST. Z and Y appear in the dimension statement in subroutine CFIT. Z,Y, and PRCU appear in the dimension statement in subroutine LNFIT. AREA, PRCU, and PCNT appear in the dimension statement in subroutine LNDIST. In changing XDC, it is the second subscript which accounts for the maximum number of size bands which can be considered.

The number of electrical sections in the direction of gas flow that can be utilized can be changed by changing the dimension of LSECT, LINCS, PS, AS, VOS, TCS, WLS, ACS, BS, SYS, VGS, VGASS, TEMPS, VISS, RFS, START1, START2, START3, VSTAR, and NWS. LSECT, LINCS, and PS appear in COMMON/BLK2/. AS, VOS, TCS, WLS, ACS, BS, SYS, VGS, VGASS, TEMPS, VISS, RFS, START1, START2, START3, and VSTAR appear in COMMON/BLK6/. NWS appears in COMMON/BLK19/. COMMON/BLK2/ appears in the main program and in subroutines PRTINP and ADJUST. COMMON/BLK6/ appears in those locations previously designated. COMMON/BLK19/ appears in the main program and subroutines PRTINP, PRTCHG, and ADJUST. LSECT appears in the dimension statement in subroutine SPCHG1.

The number of grid points that can be utilized in the calculation of electrical conditions can be changed by changing the dimensions of VCOOP, RHO, EX, OLDRO, OLDV, CDNSTY, V, EY, EAVGS, CHFIDS, ECOLLS, EAVG, CHFID, and ECOLL. VCOOP appears in COMMON/BLK13/. EAVG and CHFID appear in COMMON/BLK8/. ECOLL appears in COMMON/BLK9/. COMMON/BLK3/ appears in the main program and subroutines CMAN, EFLD1, and EFLD2. COMMON/BLK8/ appears in the main program and subroutines SPCHG2, EFLD2, and PRTCHG. COMMON/BLK9/ appears in the main program and subroutine EFLD2. RHO, EX, OLDRO, OLDV, CDNSTY, V, and EY appear in the dimension statement in subroutine EFLD1. RHO, EX, OLDRO, OLDV, CDNSTY, V, EY, EAVGS, CHFIDS, and ECOLLS appear in the dimension statement in subroutine EFLD2. VCOOP, RHO, EX, OLDRO, OLDV, CDNSTY, V, and EY are doubly subscripted variables with the first subscript referring to the number of grid points in the direction perpendicular to the gas flow and the second subscript referring to the number of grid points in the direction parallel to the gas flow. EAVG, CHFID, ECOLL, EAVGS, CHFIDS, and ECOLLS are singly subscripted variables whose dimension must be a value of two less than twice the dimension of the second subscript in the variables VCOOP, RHO, EX, OLDRO, OLDV, CDNSTY, V, and EY.

The number of rapping puff particle size distributions that can be utilized can be changed by changing the dimension of ARD50 and ARSIGM. ARD50 and ARSIGM appear in COMMON/BLK12/. COMMON/BLK12/ appears in the main program and in subroutines PRTINP and ADJUST.

The number of sets of nonideal conditions of nonuniform gas velocity distribution and gas sneakage and/or particle reentrainment without rapping that can be utilized can be changed by changing the dimension of ASNUCK, AZIGGY, and AZNUMS. These variables appear in COMMON/BLK12/. COMMON/BLK12/ appears in those locations previously designated.

If any changes are made that affect arrays, it should be pointed out that these changes will also affect the limitations on the input data discussed in Section 3. The limitations on the input data discussed previously are only applicable to the version of the program presented in Appendix C of Volume 1. If changes are made, new limitations on the input data must be established.

SECTION 6

EXAMPLE CASES AND COMPARISONS BETWEEN MODEL PREDICTIONS AND EXPERIMENTAL MEASUREMENTS

COMPARISONS OF MODEL PREDICTIONS WITH LABORATORY DATA

In order to have controlled experimental data with which to compare predictions of the mathematical model, a laboratory-scale precipitator has been constructed for the purpose of studying collection of fine particles under essentially idealized conditions. For the experiments which will be discussed here, the carrier gas was ambient air and the particulate source was an atomizer which produces an aerosol of dioctyl phthalate (DOP) containing many different particle sizes. A complete description of this precipitator and the experimental techniques used to make the measurements can be found elsewhere[2,3] and will not be given here.

In these experiments, the collected oil droplets drained from the collection electrode by gravity. Thus, particle reentrainment was not a factor. Gas bypassage of electrified regions was measured to be approximately 10% per baffled section for the four-section precipitator. The standard deviation of the velocity distribution at the inlet of the precipitator, expressed as a percentage of the average velocity, was measured to be approximately 10%. Since the particles were spherical, particle charging theories can be rigorously applied. The above considerations indicate that nonideal effects should be small. Thus, an ideal calculation of particle collection efficiencies should yield results which are only slightly higher than those determined experimentally.

Example 1

In this example, the predictions of the model are compared with measured fractional collection efficiencies and effective migration velocities for a plate-to-plate spacing of 25.4 cm, wire-to-wire spacing of 12.7 cm, wire radius of 0.1191 cm, gas velocity of 0.976 m/sec, and current density at the plate of 25.8 na/cm^2. These parameters are also characteristic of full-scale precipitators. The inlet mass loading and particle size distribution, operating voltages and currents, gas flow rate and velocity, and gas temperature and pressure were measured and are used as input data for the model. A reduced ionic effective mobility of

1.65×10^{-4} m^2/V-sec is used in the model since the use of this value results in good agreement between theoretical and experimental voltage-current characteristics for corona discharge in ambient air. Although the precipitator is divided into four baffled and independent electrical sections, the last two sections were connected together during the experiment and this is reflected in the input data to the model.

Figure 2 shows a comparison of the experimental fractional collection efficiencies and effective migration velocities with those predicted by the model. Table 4 gives the input data card set which was used to obtain the model predictions. The computation times required to run this example on the DEC PDP 15/76, IBM 370/158, UNIVAC 110, and CDC 7600 computers were approximately 2801, 330, 112, and 18 seconds, respectively. The output data from the computer program are givin in Appendix A.

In comparing the theoretical curves with the laboratory experimental data, certain considerations should be made. The adjusted, no-rap curves have built into them emprical correction factors which are a result of data acquired from full-scale precipitators. Since these correction factors most probably account for certain length-dependent mechanisms that are presently ignored in the model, it is doubtful that they would apply to the same degree in a much shorter laboratory precipitator. These mechanisms include particle charging near corona wires and particle concentration gradients. It might be expected that both of these mechanisms would enhance particle collection efficiencies and would be more effective the greater the length of the precipitator. Thus, the calculated adjusted, no-rap collection efficiencies should tend to be higher than those measured. Since the calculated ideal, unadjusted collection efficiencies are obtained without any consideration of the length-dependent mechanisms just mentioned, it might be expected that these values would be somewhat less than those measured.

Example 2

In this example, the predictions of the model are compared with measured fractional collection efficiencies and effective migration velocities obtained from experiments with the laboratory precipitator discussed in Example 1 when the gas velocity was 1.49 m/sec and the average current density at the plate was 10.8 nA/cm^2. All input quantities to the model were determined as previously discussed except the operating applied voltages and current densities. For this example, these quantities are predicted by the model by calculating clean-gas, voltage-current curves for each electrical section and estimating the reduction in current in each increment of length due to particles.

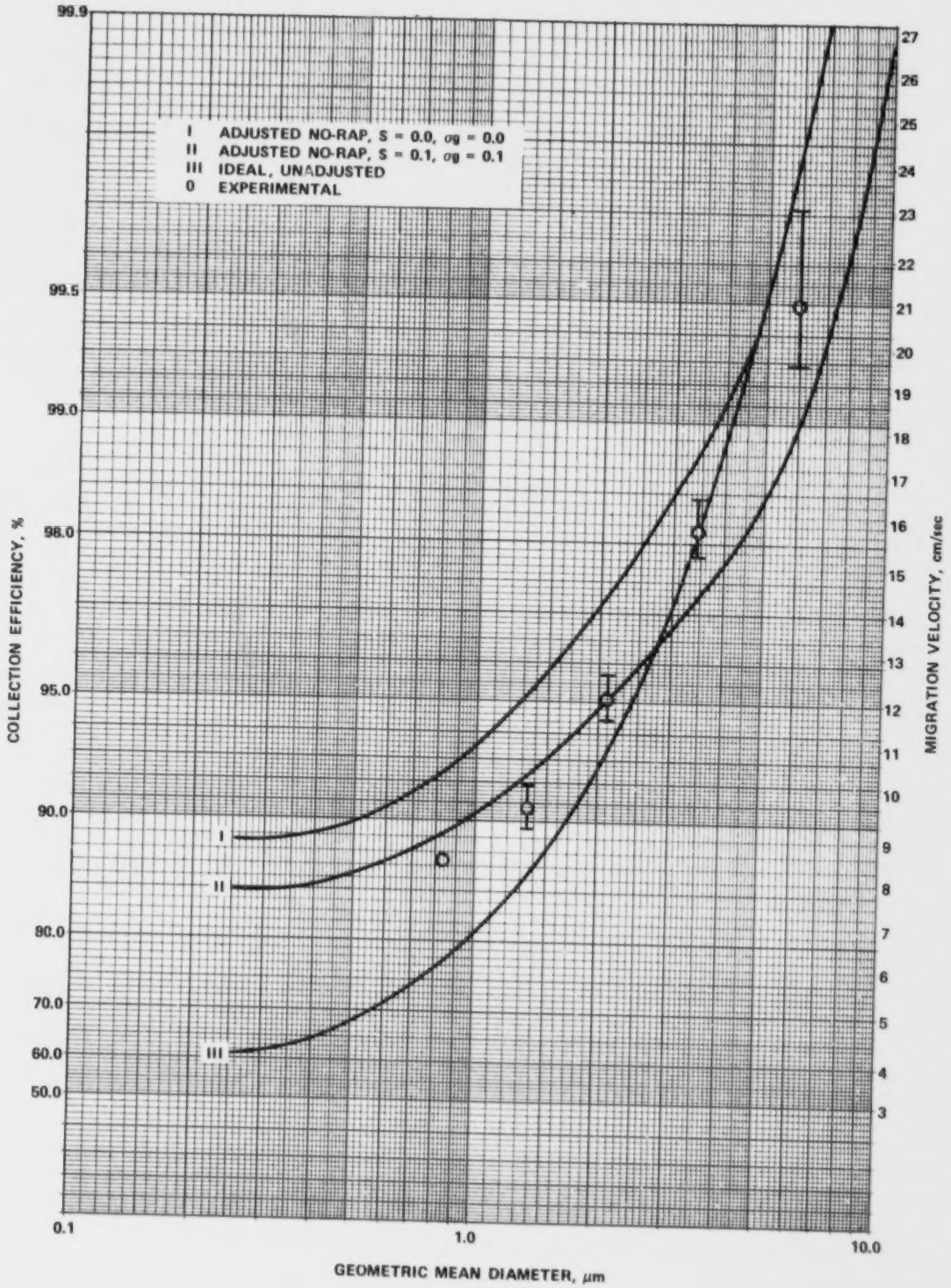

Figure 2: Comparison of experimental fractional collection efficiencies and effective migration velocities obtained from a laboratory precipitator with those predicted by the model using the measured electrical conditions.

TABLE 4. INPUT DATA CARD SET FOR EXAMPLE 1

COLUMN NUMBER

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
```

CARD NUMBER	
1	1601
2	LAB_ESP:_SCA=125FT2/1000ACFM;J=24.0UA/FT2
3	0101011010030001010102
4	1020
5	0.015___10.0____99.0____1000.0__5.1_____1.03____0.0001651.0_____1500000.1.00E+09
6	0.000.004.000.100.104.00
7	0.20____0.30____0.40____0.50____0.60____0.80____1.00____1.20____1.40____1.80
8	2.20____3.00____4.00____6.00____10.0____20.0
9	0.0_____0.0002__0.4002__1.0002__2.6672__7.6672__12.6002_17.6002_21.3332_29.3332
10	36.0002_46.6672_57.3342_68.6672_80.6672_100.0
11	03030306
12	+6.2500E+00+4.6000E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
13	+2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
14	+6.2500E+00+4.5800E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
15	+2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
16	+1.2500E+01+4.4400E+04+3.0000E-04+1.2500E+01+4.6875E-02+5.0000E+00+1.0000E+01
17	+2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01

Figure 3 shows the measured voltage-current characteristics for the three electrical sections without and with particles. Also shown is the theoretical clean-air, voltage-current curve which was used in the calculations for each of the electrical sections. The theoretical curve was generated using a reduced effective ion mobility of 1.65×10^{-4} $m^2/V\text{-sec}$ and a roughness factor of 0.90. Better fits to the clean-air curves could have been obtained by adjusting the reduced effective ion mobility and roughness factor and using slightly different values of these parameters in the different electrical sections. However, for purposes of illustrating the use of the theoretical voltage-current calculations, the agreement between the experimental curves and the theoretical curve is sufficient. At 10.8 nA/cm^2, the theoretical curve is slightly above the clean-air curves for sections 1 and 2 and is slightly below the clean-air curve for the last section.

Figure 4 shows a comparison of the experimental fractional collection efficiencies and effective migration velocities with those predicted by the model. Table 5 gives the input data card set which was used to obtain the model predictions. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 47,886 seconds. The output data from the computer program are given in Appendix B.

For sections 1, 2, and 3 and measured operating applied voltages of 40.8, 40.8, and 39.6 kV, respectively, the computer model utilizes operating applied voltages of 40.7, 40.7, and 39.5 kV, respectively, and predicts average current densities at the plate of 11.9, 11.8, and 8.9 nA/cm^2, respectively. The average value of the predicted current density over the length of the precipitator is 10.4 nA/cm^2 which compares favorably with the value of 10.8 nA/cm^2 which was maintained in each electrical section during the experiments. In this example, the reason why all the theoretical curves lie below the experimental data can be attributed to the procedure used in the calculations. When the voltage-current calculations are employed, the model takes into account the nonuniformity of the electric field and current density distributions instead of using average values for an entire electrical section based only on the applied voltage and the wire-to-plate spacing. On the average, this results in significantly lower current densities and electric fields for use in particle charging and particle collection than are used in the model when the operating voltage and currents are known. The effects of using this procedure are especially pronounced for lower current densities where the particle charging rates are low and longer residence times are required for particles to attain a limiting value of charge. Also, since the correction factors for the no-rap migration velocities are based on comparisons of experimental data with results obtained from the model using known operating voltages and currents, these correction factors do not compensate enough for underprediction in this case.

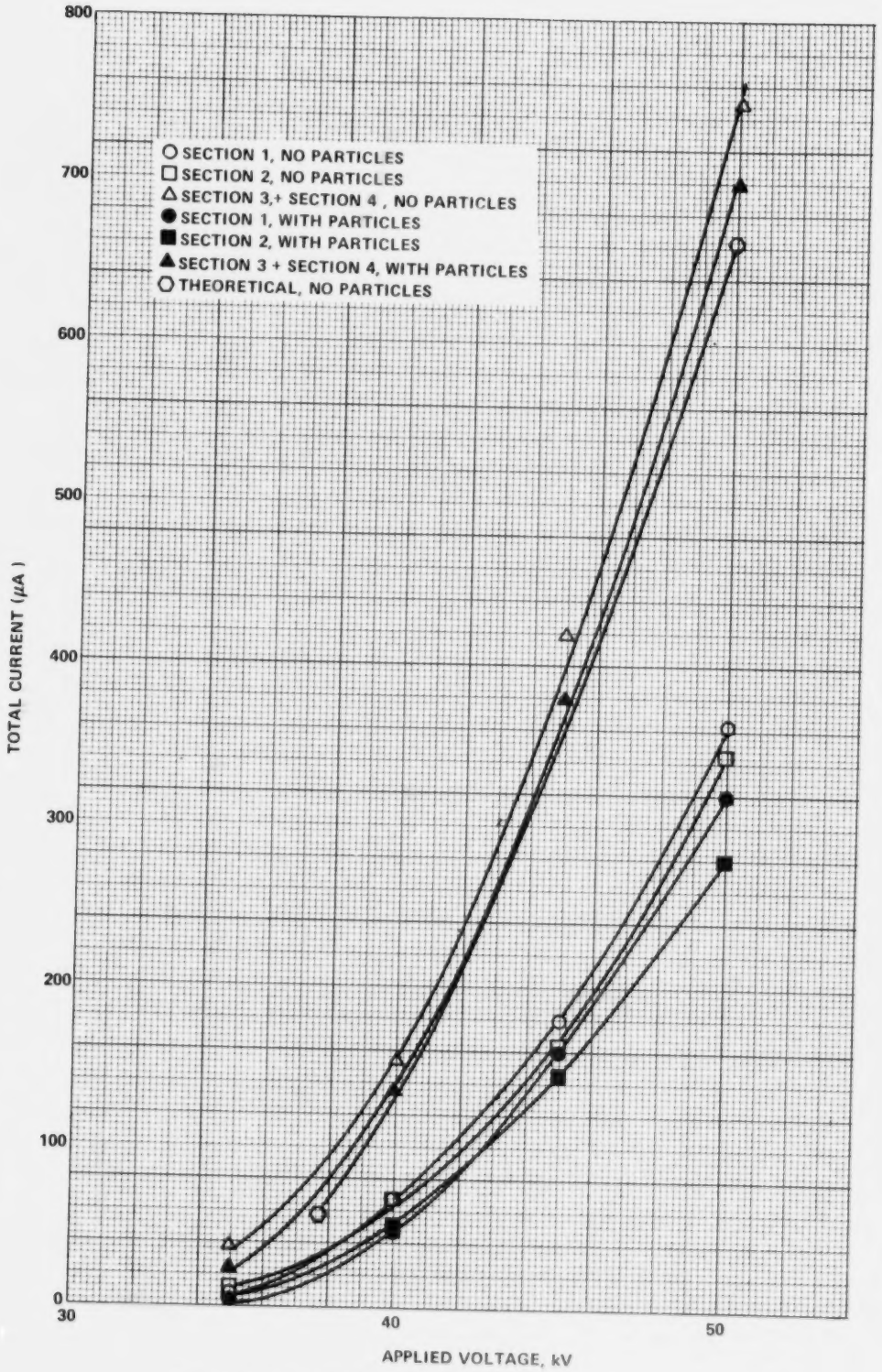

Figure 3: Experimental and theoretical voltage-current curves for the laboratory precipitator.

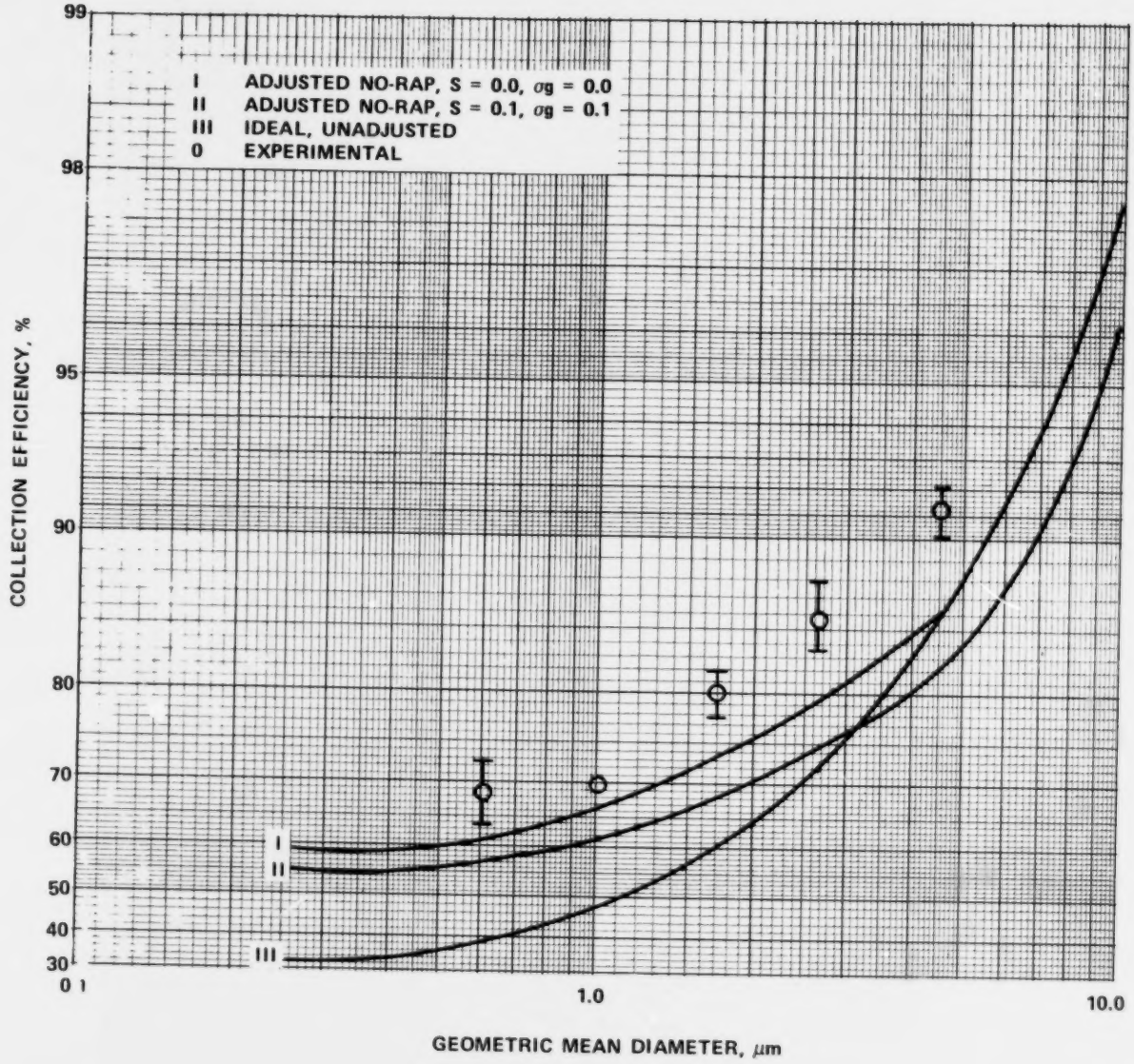

Figure 4: Comparison of experimental fractional collection efficiencies obtained from a laboratory precipitator with those predicted by the model using theoretical voltage-current calculations.

TABLE 5. INPUT DATA CARD SET FOR EXAMPLE 2

```
                                                  COLUMN NUMBER
                         1         2         3         4         5         6         7         8
                1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
CARD
NUMBER
  1     1601
  2     LAB_ESP:_SCA=82FT2/1000ACFM;CALCULATED_V-I_FOR_EACH_ELECTRICAL_SECTION
  3     01010215150100010101 02
  4     1020
  5     2002210102
  6     0.065___10.0____99.0____1000.0__5.1_____1.03____0.0001651.0_____1500000.1.00E+09
  7     0.000.004.000.100.104.00
  8     0.20____0.30____0.40____0.50____0.60____0.80____1.00____1.20____1.40____1.80
  9     2.20____3.0_____4.0_____6.0_____10.0____20.0
 10     0.0_____0.0076__0.0563__0.2682__0.8652__2.9845__5.9695__9.5515__12.835__19.7004
 11     26.8643_38.8042_49.2516_64.1765_79.1014_100.0
 12     03060612
 13     +6.2500E+00+4.0800E+04+6.2500E-05+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
 14     +2.5000E+00+3.0533E+02+4.8853E+00+7.6000E+01+1.0000E+00+1.8000E-05+4.1667E-01
 15     +9.0000E-01+6.0000E-05+2.0000E-05+2.0000E-05+3.8000E+04
 16     +6.2500E+00+4.0800E+04+6.2500E-05+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
 17     +2.5000E+00+3.0533E+02+4.8853E+00+7.6000E+01+1.0000E+00+1.8000E-05+4.1667E-01
 18     +9.0000E-01+6.0000E-05+2.0000E-05+2.0000E-05+3.8000E+04
 19     +1.2500E+01+3.9600E+04+1.2500E-04+1.2500E+01+4.6875E-02+5.0000E+00+1.0000E+01
 20     +2.5000E+00+3.0533E+02+4.8853E+00+7.6000E+01+1.0000E+00+1.8000E-05+4.1667E-01
 21     +9.0000E-01+6.0000E-05+2.0000E-05+2.0000E-05+3 8000E+04
```

COMPARISONS OF MODEL PREDICTIONS WITH FIELD DATA

Recent studies[4,5] have provided sufficient experimental data characteristic of full-scale, industrial precipitators with which to compare the predictions of the mathematical model. In these studies, the physical quantities which must be known in order to adequately apply the model have been measured. These quantities include the precipitator geometry, inlet mass loading and particle size distribution, voltage-current characteristics, average flow rate, velocity, temperature, and pressure of the gas stream, gas composition, and bulk particulate resistivity. The techniques for measuring these quantities are described elsewhere[6] in the literature and will not be discussed here. In the following two examples, the model is used to simulate the operation of two full-scale precipitators collecting fly ash and the predictions of the model are compared with the measured data.

Example 3

In this example, the predictions of the model are compared with measured fractional collection efficiencies, fractional effective migration velocities, and discrete outlet mass loadings for a cold-side precipitator. Table 6 gives the input data card set which was used in the model to simulate the operation of the precipitator. All fundamental input parameters having a significant effect on precipitator performance were measured or known except the reduced effective ion mobility and gas viscosity. The value of reduced effective ion mobility was assumed to be 2.2×10^{-4} $m^2/V\text{-sec}$ which according to Table 1 may be somewhat low. The value of gas viscosity was obtained from Table 2 and it was assumed that air and the flue gas would have approximately the same viscosity at the same temperature and moisture content. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 6,181 seconds.

Figure 5 shows a comparison of the experimental fractional collection efficiencies and effective migration velocities with those predicted by the model. Figure 6 shows a comparison of the experimental discrete outlet mass loadings with those predicted by the model. The output data from the computer program are given in Appendix C. In Figure 5, theoretical points are shown for pairs (σ_g, S) of σ_g and S with values of (0.0, 0.0) and (0.25,0.1). From experience with modeling full-scale precipitators, these values of the normalized standard deviation of the gas velocity distribution (σ_g) and the fraction per baffled section of gas sneakage and/or particle reentrainment without rapping (S) encompass the range of values which are typical of precipitators that are in good working condition. The particle size distribution of the "rapping puff" was determined by the experimental log-normal distribution (MMD = 6.0 μm, σ_p = 2.5) which is built into the program. Since the theoretical NO-RAP points for σ_g = 0 and S = 0 agree well with the measured data up to approximately

TABLE 6. INPUT DATA CARD SET FOR EXAMPLE 3

CARD NUMBER	COLUMN NUMBER 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
1	1 4 0 1
2	F U L L - S C A L E , C O L D - S I D E _ E S P : _ P L A N T _ A ; _ S C A = 2 4 3 F T 2 / 1 0 0 0 A C F M ; J = 1 5 . 9 U A / F T 2
3	0 1 0 1 0 1 1 0 1 0 0 3 0 0 0 1 0 1 0 1 0 2
4	1 0 2 0
5	1 . 9 6 6 _ _ _ 2 7 . 0 _ _ _ _ 9 9 . 6 _ _ _ _ 2 2 7 0 . 0 _ _ 1 0 0 . 0 _ _ _ 1 . 2 _ _ _ _ _ 0 . 0 0 0 2 2 _ 1 . 0 _ _ _ _ _ 1 5 0 0 0 0 0 . 5 . 0 0 E + 1 0
6	0 . 0 0 0 . 0 0 3 . 0 0 0 . 1 0 0 . 2 5 3 . 0 0
7	0 . 1 0 _ _ _ _ 0 . 3 0 _ _ _ _ 0 . 5 0 _ _ _ _ 0 . 9 0 _ _ _ _ 1 . 3 0 _ _ _ _ 1 . 9 0 _ _ _ _ 3 . 1 0 _ _ _ _ 3 . 9 0 _ _ _ _ 5 . 1 0 _ _ _ _ 6 . 9 0
8	1 0 . 1 0 _ _ _ 1 4 . 9 0 _ _ _ 2 5 . 1 0 _ _ _ 2 9 . 9 0
9	0 . 0 _ _ _ _ _ 0 . 0 3 3 _ _ _ 0 . 2 8 6 _ _ _ 1 . 1 8 9 _ _ _ 2 . 0 0 4 _ _ _ 3 . 5 2 4 _ _ _ 7 . 0 4 8 _ _ _ 8 . 7 0 _ _ _ _ 1 0 . 3 5 2 _ _ 1 2 . 3 3 4
10	1 5 . 6 3 8 _ _ 2 0 . 4 8 4 _ _ 3 2 . 5 9 9 _ _ 1 0 0 . 0
11	0 3 1 0 1 0 1 0
12	+ 2 . 6 4 6 0 E + 0 4 + 4 . 0 6 0 0 E + 0 4 + 2 . 7 3 0 0 E - 0 1 + 1 . 5 7 2 0 E + 0 4 + 8 . 2 5 0 0 E - 0 2 + 5 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
13	+ 3 . 6 2 5 0 E + 0 0 + 3 . 2 7 2 4 E + 0 5 + 4 . 1 0 0 0 E + 0 0 + 3 . 1 5 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 2 9 0 0 E - 0 5 + 9 . 0 0 0 0 E - 0 1
14	+ 2 . 6 4 6 0 E + 0 4 + 4 . 2 1 0 0 E + 0 4 + 4 . 3 3 0 0 E - 0 1 + 1 . 5 7 2 0 E + 0 4 + 8 . 2 5 0 0 E - 0 2 + 5 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
15	+ 3 . 6 2 5 0 E + 0 0 + 3 . 2 7 2 4 E + 0 5 + 4 . 1 0 0 0 E + 0 0 + 3 . 1 5 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 2 9 0 0 E - 0 5 + 9 . 0 0 0 0 E - 0 1
16	+ 2 . 6 4 6 0 E + 0 4 + 4 . 2 4 5 0 E + 0 4 + 5 . 5 8 0 0 E - 0 1 + 1 . 5 7 2 0 E + 0 4 + 8 . 2 5 0 0 E - 0 2 + 5 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
17	+ 3 . 6 2 5 0 E + 0 0 + 3 . 2 7 2 4 E + 0 5 + 4 . 1 0 0 0 E + 0 0 + 3 . 1 5 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 2 9 0 0 E - 0 5 + 9 . 0 0 0 0 E - 0 1

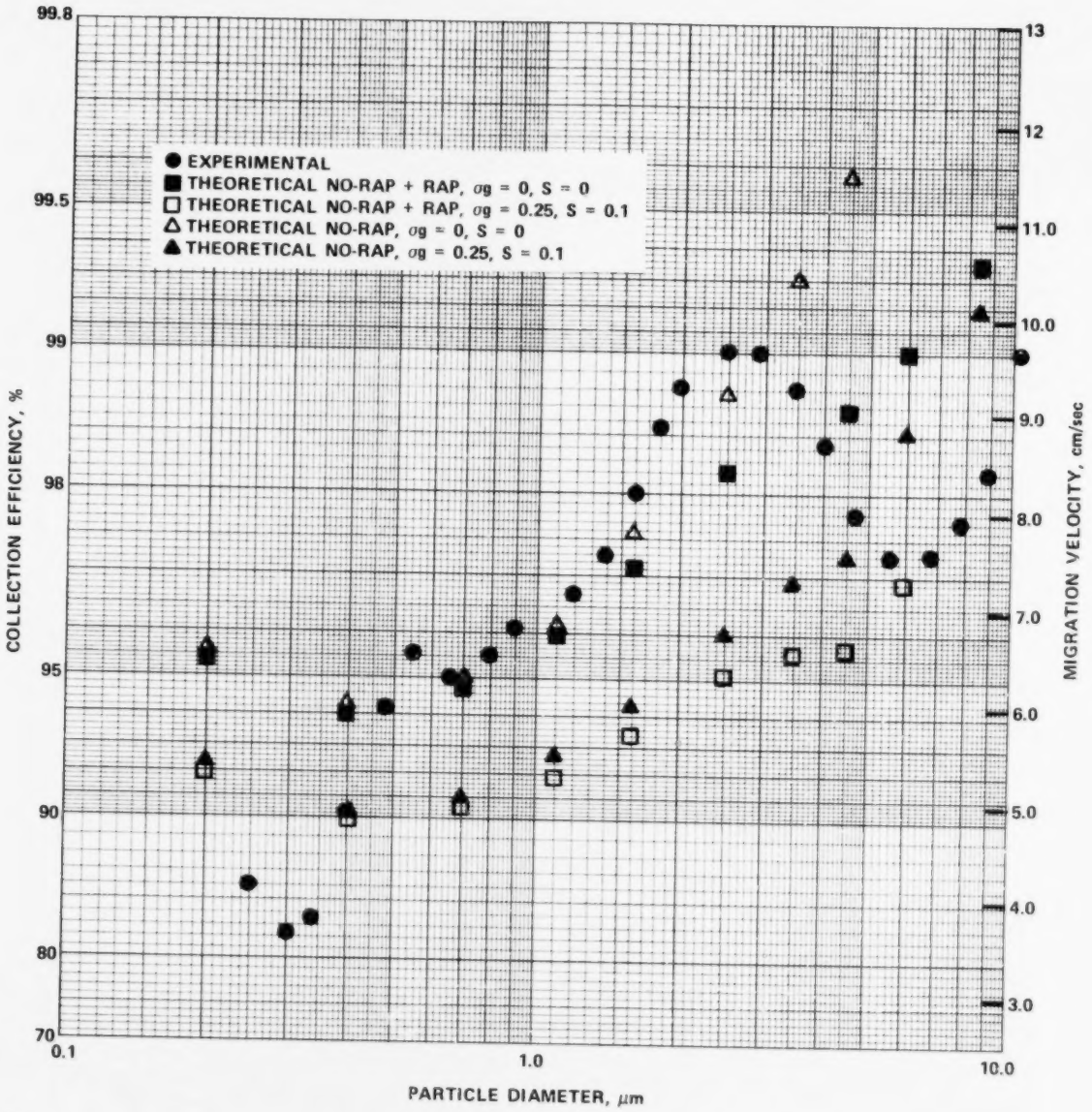

Figure 5: Comparison of experimental fractional collection efficiencies and effective migration velocities obtained from a full-scale, cold-side precipitator with those predicted by the model.

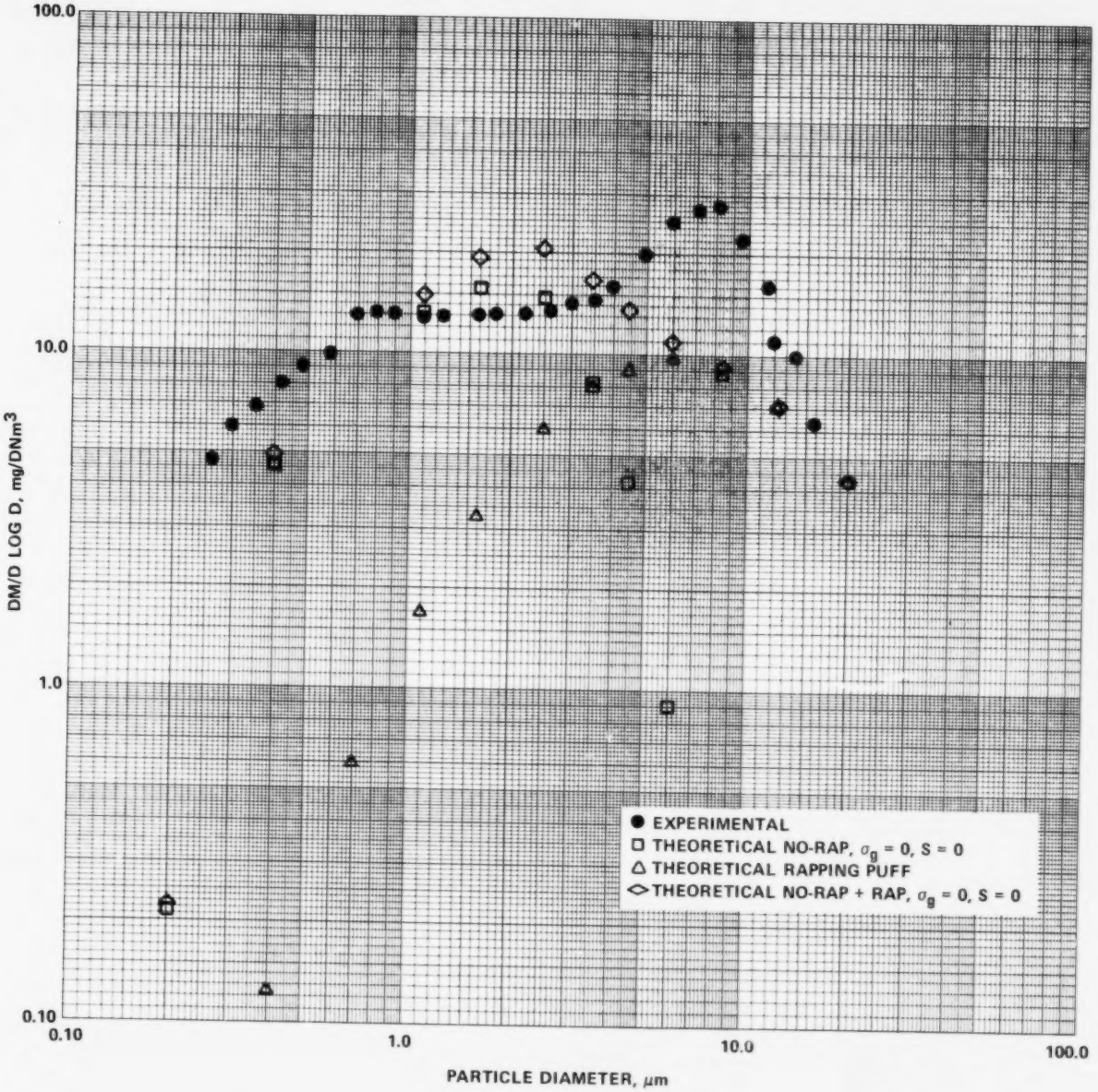

Figure 6: Comparison of experimental discrete outlet mass loadings obtained from a full-scale, cold-side precipitator with those prediced by the model.

3.0 μm and the theoretical NO-RAP+RAP points show less agreement with the measured data from 3.0 μm to 10.0 μm, the poorer agreement from 3.0 μm to 4.0 μm can be attributed to the "rapping puff" which was used. Better agreement would be obtained with a "rapping puff" which has a larger mass loading and a particle size distribution with a larger MMD. This is readily seen by examining Figure 6.

Example 4

In this example, the predictions of the model are compared with measured fractional collection efficiencies and migration velocities for a hot-side precipitator. Table 7 gives the input data card set which was used to simulate the operation of the precipitator. All fundamental input parameters were determined in the same manner as discussed in Example 3. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 4,779 seconds.

Figure 7 shows a comparison of the experimental fractional collection efficiencies and effective migration velocities with those predicted by the model. The output data from the computer program are given in Appendix D.

TABLE 7. INPUT DATA CARD SET FOR EXAMPLE 4

CARD NUMBER	COLUMN NUMBER 1234567890123456789012345678901234567890123456789012345678901234567890123456789 0
1	1501
2	FULL-SCALE,HOT-SIDE_ESP:_PLANT_B;SCA=390FT2/1000ACFM;J=34.3UA/FT2
3	01010110100300010102 02
4	1020
5	2.51____36.0____99.6____2270.0__100.0___1.2_____0.00022_1.0_____1500000.1.90E+10
6	0.000.004.000.100.254.00
7	0.20____0.40____0.70____1.00____1.50____2.00____3.00____4.00____5.00____7.00
8	10.00___15.00___25.00___30.0____100.0
9	0.0_____0.1479__0.57421_1.00922_1.72264_2.74926_6.52514_9.48321_11.1362513.05029
10	15.6255520.1844530.9726935.49679100.0
11	0409090909
12	+4.2120E+04+3.5880E+04+1.2200E+00+5.6160E+04+5.4500E-02+4.5000E+00+1.2000E+01
13	+4.5000E+00+4.3207E+05+3.7958E+00+6.2400E+02+1.0000E+00+2.8000E-05+1.0000E+00
14	+4.2120E+04+3.3950E+04+1.6720E+00+5.6160E+04+5.4500E-02+4.5000E+00+1.2000E+01
15	+4.5000E+00+4.3207E+05+3.7958E+00+6.2400E+02+1.0000E+00+2.8000E-05+1.0000E+00
16	+4.2120E+04+2.9130E+04+1.4200E+00+5.6160E+04+5.4500E-02+4.5000E+00+1.2000E+01
17	+4.5000E+00+4.3207E+05+3.7958E+00+6.2400E+02+1.0000E+00+2.8000E-05+1.0000E+00
18	+4.2120E+04+2.7500E+04+1.4600E+00+5.6160E+04+5.4500E-02+4.5000E+00+1.2000E+01
19	+4.5000E+00+4.3207E+05+3.7958E+00+6.2400E+02+1.0000E+00+2.8000E-05+1.0000E+00

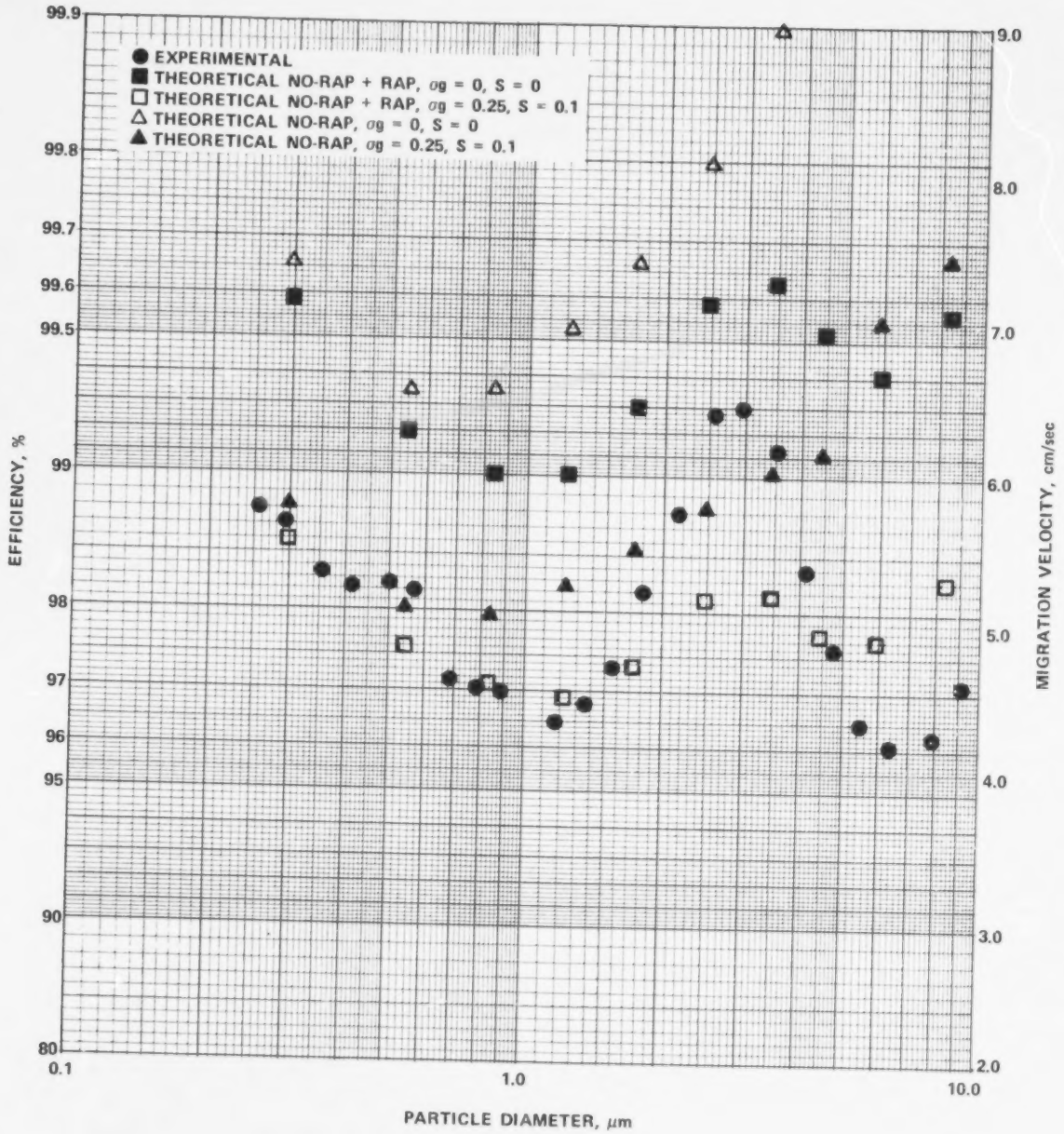

Figure 7: Comparison of experimental fractional collection efficiencies and effective migration velocities obtained from a full-scale, hot-side precipitator with those predicted by the model.

SECTION 7

APPLICATIONS OF THE MODEL

EFFECT OF PARTICLE SIZE DISTRIBUTION

The distribution of the various particle sizes entering a precipitator influences the electrical operating conditions and the overall mass collection efficiency. Normally, the distribution of particulate emissions from industrial sources can be approximated by a log-normal distribution. This type of distribution can be completely characterized by the mass median diameter (MMD) and the geometric standard deviation (σ_p), and the effect of both parameters on precipitator performance must be considered. The MMD provides a representative size for the distribution and σ_p provides a measure of the dispersion of the distribution.

The computer program for the model allows the user to specify the MMD and σ_p for a log-normal distribution, along with the desired particle size bands, and will then construct an inlet particle size distribution histogram for use in the model. By using a basic data set and shortened data sets, the effect of particle size distribution on precipitator performance can be easily obtained.

Example 5

In this example, the effects that certain particle size distributions can have on precipitator performance are estimated for the laboratory precipitator and conditions used in Example 1. Although the particle size distribution will influence the voltage-current characteristics and, depending on the mass loading, can sometimes have a considerable effect, it is assumed that the voltage-current characteristics remain constant in order to obtain trends. If a more representative calculation is necessary, this can be provided by using the option which calculates voltage-current characteristics but this requires considerably more computer time.

For this example, the effect of MMD on overall mass collection efficiency was estimated by holding σ_p fixed at a value of 2.5 and using values of 2.0, 5.0, 10.0, 15.0, and 25.0 μm for the MMD. The effect of σ_p on overall mass collection efficiency was estimated by holding the MMD fixed at 10 μm and using values of 1.5, 5.0, 10.0, and 15.0 for σ_p. The results obtained for σ_p = 2.5

and MMD = 10.0 μm when holding σ_p constant can also be used in analyzing the effect of σ_p on overall mass collection efficiency. Table 8 gives the input data card set which was used to perform the calculations. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 25,968 seconds.

Figure 8 shows curves obtained from the calculations. Non-ideal effects have been ignored in obtaining the curves which are shown. The output data from the computer program are given in Appendix E. The results of these calculations point out the importance of considering the effect of variations in particle size distribution on overall mass collection efficiency for a given specific collection area and set of electrical operating conditions. A precipitator should be designed with the capability of meeting emissions standards with a somewhat less favorable particle size distribution than that currently existing or that anticipated in order to provide a margin of safety. This is necessary because any changes in the process which produces the emissions may result in a less favorable particle size distribution.

EFFECT OF SPECIFIC COLLECTION AREA

An important parameter which influences the performance of a precipitator is called the specific collection area (SCA) and is defined as the ratio of the total collection area to the total gas volume flow. The SCA can be changed by changing either the collection plate area or the gas volume flow or both. In effect, changes in SCA result in changes in the treatment time experienced by the particles. Thus, increasing the SCA of a precipitator increases the collection efficiency.

The SCA provides the most flexible variable in designing a precipitator. Although the SCA has practical limitations, it has no physical limitations and can be increased indefinitely. Even though a curve of efficiency versus SCA will level off for the larger values of SCA due to the exponential nature of the collection mechanism, greater efficiency can always be obtained from increased SCA.

The computer program for the model allows the user to easily examine the effects of SCA on precipitator performance by using a basic data set and shortened data sets. The SCA is changed by changing the gas volume flow and gas velocity through the precipitator and leaving the collection plate area fixed. It should be pointed out that for certain values of SCA this method of producing different SCAs will lead to impractical values of gas volume flow and gas velocity which are not physically meaningful. However, this approach is equivalent to changing the collection plate area in the present version of the model.

TABLE 8. INPUT DATA CARD SET FOR EXAMPLE 5

COLUMN NUMBER

```
         1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
CARD
NUMBER
   1     1401
   2     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=2UM;SIGMAP=2.5
   3     0102011010030001010101
   4     1020
   5     0.015___10.0____99.0____100.0___5.1_____1.03____0.0001651.0_____1500000.1.00E+09
   6     0.000.004.00
   7     0.10____0.30____0.50____0.70____0.90____1.10____2.90____5.10____6.90____9.10
   8     10.90___19.10___30.90___49.10
   9     2.0_____2.5
  10     03030306
  11     +6.2500E+00+4.6000E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
  12     +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
  13     +6.2500E+00+4.5800E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
  14     +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
  15     +1.2500E+01+4.4400E+04+3.0000E-04+1.2500E+01+4.6875E-02+5.0000E+00+1.0000E+01
  16     +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
  17     1402
  18     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=5UM;SIGMAP=2.5
  19     5.0_____2.5
  20     1402
  21     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=2.5
  22     10.0____2.5
  23     1402
  24     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=15UM;SIGMAP=2.5
  25     15.0____2.5
  26     1402
  27     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=25UM;SIGMAP=2.5
  28     25.0____2.5
  29     1402
  30     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=1.5
  31     10.0____1.5
  32     1402
  33     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=5.0
  34     10.0____5.0
  35     1402
  36     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=10.0
  37     10.0____10.0
  38     1402
  39     LAB_ESP:_SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=15.0
  40     10.0____15.0
```

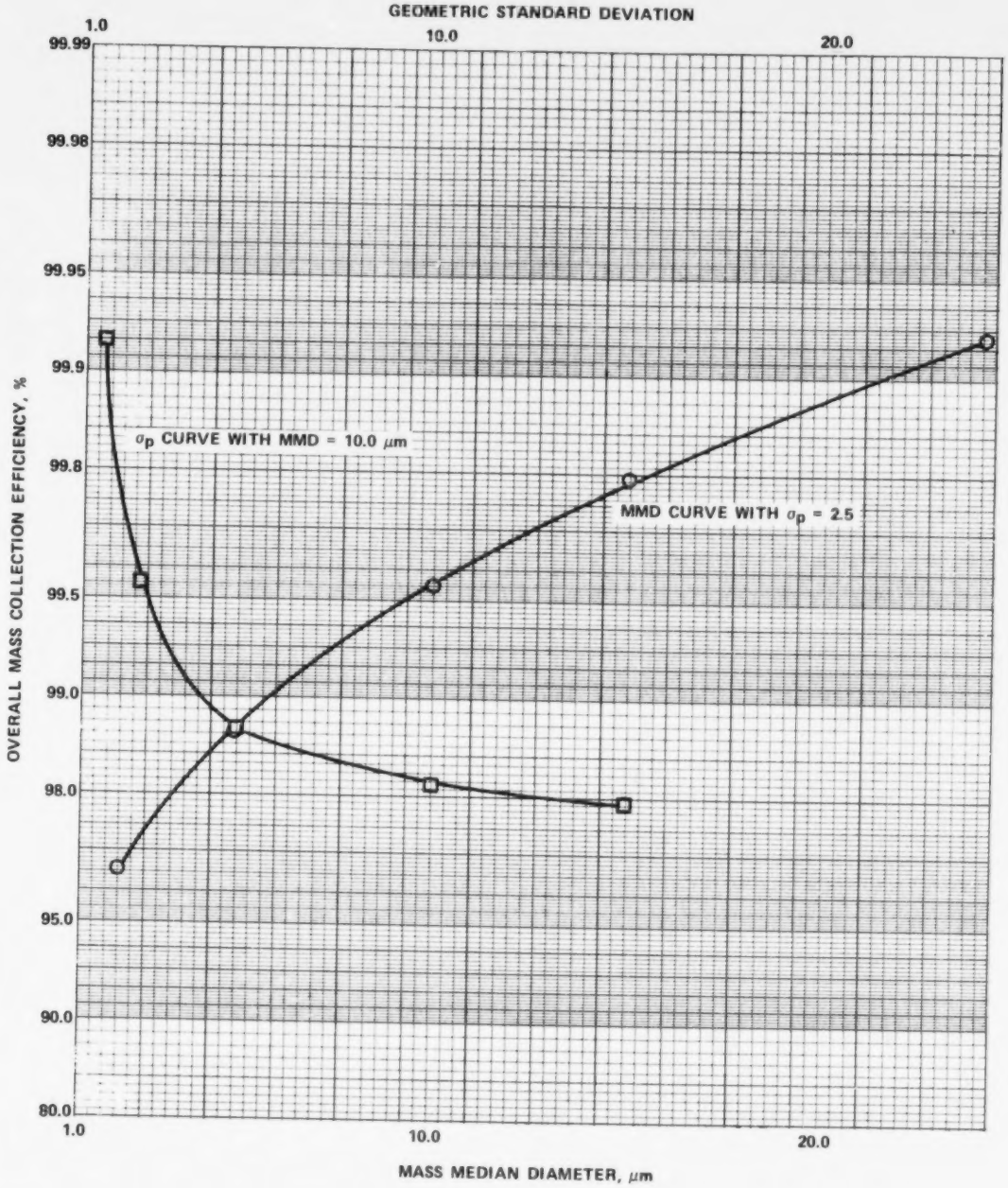

Figure 8: Effect of particle size distribution on overall mass collection efficiency.

Example 6

In this example, the effect of SCA on the overall mass collection efficiency is examined using the geometry and operating conditions in Example 1. Although the voltage-current characteristics will change with changes in SCA, it was assumed that they remained constant in order to obtain trends. If a more representative calculation is necessary, this can be provided by using the option which calculates voltage-current characteristics but this requires considerably more computer time. Overall mass collection efficiencies were determined for SCAs of 9.85, 39.4, 59.1, 78.7, 118.1, and 157.5 ($m^2/(m^3/sec)$) or 50, 200, 300, 400, 600, and 800 ($ft^2/(1000\ ft^3/min)$), respectively. The results obtained in Example 1 for an SCA of 24.6 ($m^2/(m^3/sec)$) or 125 ($ft^2/(1000\ ft^3/min)$) can also be used in this example. Table 9 gives the input data card set which was used to perform the calculations. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 15,558 seconds.

Figure 9 shows curves of overall mass collection efficiency as a function of SCA that were obtained from the calculations. In obtaining the curves, the values of σ_g and S were taken to be zero. The output data from the computer program are given in Appendix F.

These curves point out the large effect SCA has on precipitator performance. Also, two other features of interest should be discussed. First, the NO-RAP curve is significantly higher than the unadjusted, ideal curve. This is due to the fact that the inlet particle size distribution (MMD = 4 μm) is weighted towards the fine particle size range where the correction factors to the NO-RAP migration velocities are applied. As the MMD of the inlet particle size distribution increases, the NO-RAP curve and the unadjusted, ideal curve come into better agreement. Second, the detrimental effect rapping reentrainment can have on precipitator performance is clearly seen. Even with good electrical operating conditions (45.2 kV and 25.8 nA/cm^2), high collection efficiencies are difficult to achieve with typical losses in collection efficiency due to rapping reentrainment without going to large values of SCA. From the curves, an overall mass collection efficiency of 99.9% can be obtained at an SCA of 49.25 $m^2/(m^3/sec)$ or 250 $ft^2/(1000\ ft^3/min)$. However, with rapping, an SCA of 78.7 $m^2/(m^3/sec)$ or 400 $ft^2/(1000\ ft^3/min)$ is required in order to obtain the same overall mass collection efficiency. With worse electrical operating conditions, the effects of rapping reentrainment would be even more severe due to the collection of more mass on the outlet fields of the precipitator.

EFFECT OF APPLIED VOLTAGE AND CURRENT DENSITY

In practice, it is desirable to operate a precipitator at the highest values of applied voltage and current density that can be

TABLE 9. INPUT DATA CARD SET FOR EXAMPLE 6

CARD NUMBER	COLUMN NUMBER
	12345678901234567890123456789012345678901234567890123456789012345678901234567890
1	1601
2	LAB_ESP:_SCA=50FT2/1000ACFM;J=24UA/FT2
3	01010110100300010101 01
4	1020
5	0.015___10.0____99.0____1000.0__5.1_____1.03____0.0001651.0_____1500000.1.00E+09
6	0.000.004.00
7	0.20____0.30____0.40____0.50____0.60____0.80____1.00____1.20____1.40____1.80
8	2.20____3.0_____4.0_____6.0_____10.0____20.0
9	0.0_____0.0002__0.4002__1.0002__2.6672__7.6672__12.6002_17.3332_21.3332_29.3332
10	36.0002_46.6672_57.3342_68.6672_80.6672_100.0
11	03030306
12	+6.2500E+00+4.6000E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
13	+2.5000E+00+5.0000E+02+8.0000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
14	+6.2500E+00+4.5800E+04+1.5000E-04+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
15	+2.5000E+00+5.0000E+02+8.0000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
16	+1.2500E+01+4.4400E+04+3.0000E-04+1 2500E+01+4.6875E-02+5.0000E+00+1.0000E+01
17	+2.5000E+00+5.0000E+02+8.0000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
18	1603
19	LAB_ESP:_SCA=200FT2/1000ACFM;J=24UA/FT2
20	+1.2500E+02+2.0000E+00+1.2500E+02+2.0000E+00+1.2500E+02+2 0000E+00
21	1603
22	LAB_ESP:_SCA=300FT2/1000ACFM;J=24UA/FT2
23	+8.3333E+01+1.3333E+00+8.3333E+01+1.3333E+00+8.3333E+01+1.3333E+00
24	1603
25	LAB_ESP:_SCA=400FT2/1000ACFM;J=24UA/FT2
26	+6.2500E+01+1.0000E+00+6.2500E+01+1.0000E+00+6.2500E+01+1.0000E+00
27	1603
28	LAB_ESP:_SCA=600FT2 1000ACFM;J=24UA/FT2
29	+4.1667E+[illegible]1+6.6667E-01+4.1667E+01+6.6667E-01+4[illegible]
30	1603
31	LAB_ESP SCA=[illegible]00FT2/1000ACFM;J=24UA/F[illegible]
32	+3.[illegible]25 [illegible]

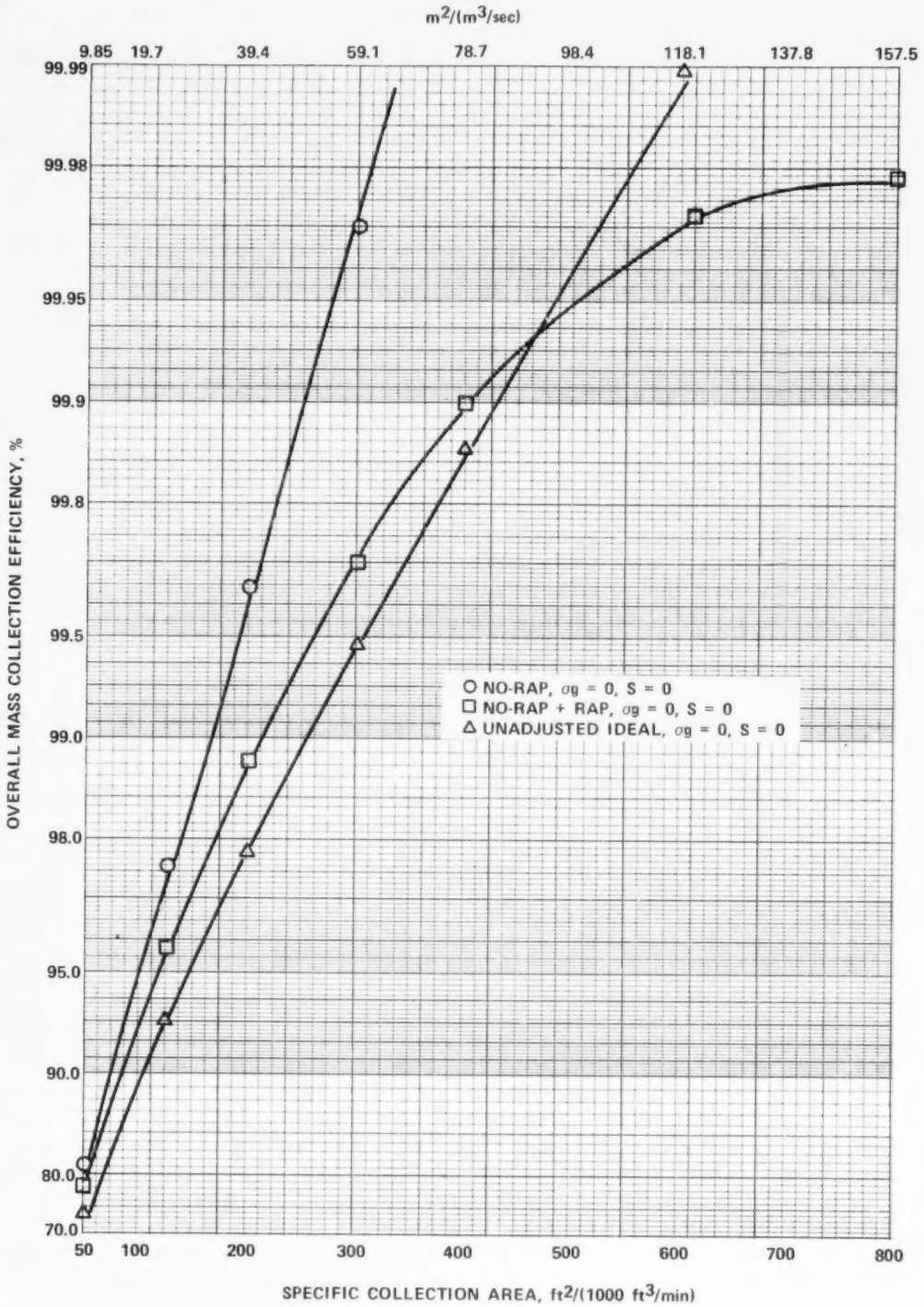

Figure 9: Effect of specific collection area on overall mass collection efficiency.

obtained without excessive sparking or back corona. Higher values of applied voltage lead to higher electric fields which result in increased particle charge and a higher value of the electric field near the collection electrode. Higher values of current density lead to higher ion densities which result in faster charging rates and an increased contribution to the total electric field near the collection electrode due to space charge. Thus, higher values of applied voltage and current density lead to higher migration velocities and higher collection efficiencies.

In analyzing the effects of applied voltage and current density with the model, it must be realized that the values of applied voltage and current density are limited by the onset of sparking or back corona which is not predicted by the model in its present form. Also, for the geometries which are used in practice, the voltage-current curve becomes very steep for higher applied voltages and large increases in current can be obtained from small increases in applied voltage. For precipitators operating with voltages and currents on the steep portion of the voltage-current curve, increasing the current will not have a very pronounced effect on improving precipitator performance because only small changes in applied voltage will be realized and the applied voltage plays the dominant role in limiting particle charge and controlling the electric field.

The computer program for the model allows the user to easily examine the effects of applied voltage and current density on precipitator performance by using a basic data set and shortened data sets. Measured or known values of applied voltage and current density can be supplied by the user or theoretical values can be determined for wire-plate geometries.

Example 7

In this example, the effect of applied voltage and current density on the overall mass collection efficiency is examined using the geometry and operating conditions in Example 1. Figure 10 shows the voltage-current curves for the three electrical sections where particles are in the gas stream. These curves were used in order to determine various applied voltages and current densities. The overall mass collection efficiency was determined for 2, 5, 10, 20, 35, and 45 nA/cm^2. The results obtained in Example 1 for 25.8 nA/cm^2 can also be used in this example. Table 10 gives the input data card set which was used to perform the calculations. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 21,067 seconds.

Figure 11 shows curves of overall mass collection efficiency as a function of average current density at the plate that were obtained from the calculations. In obtaining the curves, the values of σ_g and S were taken to be zero. The output data from the computer program are given in Appendix G.

TABLE 10. INPUT DATA CARD SET FOR EXAMPLE 7

```
                                                  COLUMN NUMBER
                    1                   2                   3                   4                   5                   6                   7                   8
         12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
CARD
NUMBER
  1      1601
  2      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=2_NA/CM2
  3      01010110100300010101 01
  4      1020
  5      0.015___10.0____99.0____1000.0__5.1_____1.03____0.0001651.0_____1500000.1.00E+09
  6      0.000.004.00
  7      0.20____0.30____0.40____0.50____0.60____0.80____1.00____1.20____1.40____1.80____
  8      2.20____3.00____4.00____6.00____10.00___20.00
  9      0.0_____0.0002__0.4002__1.0002__2.6672__7.6672__12.6002_17.3332_21.3332_29.3332
 10      36.0002_46.6672_57.3342_68.6672_80.6672_100.0
 11      03030306
 12      +6.2500E+00+3.7500E+04+1.1628E-05+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
 13      +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
 14      +6.2500E+00+3.7000E+04+1.1628E-05+6.2500E+00+4.6875E-02+5.0000E+00+5.0000E+00
 15      +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
 16      +1.2500E+01+3.4900E+04+2.3256E-05+1.2500E+01+4.6875E-02+5.0000E+00+1.0000E+01
 17      +2.5000E+00+2.0000E+02+3.2000E+00+7.6800E+01+1.0000E+00+1.8000E-05+8.3333E-01
 18      1604
 19      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=5_NA/CM2
 20      +3.9450E+04+2.9070E-05+3.9000E+04+2.9070E-05+3.7200E+04+5.8140E-05
 21      1604
 22      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=10_NA/CM2
 23      +4.1600E+04+5.8140E-05+4.1200E+04+5.8140E-05+3.9800E+04+1.1628E-04
 24      1604
 25      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=20_NA/CM2
 26      +4.4700E+04+1.1628E-04+4.4400E+04+1.1628E-04+4.3000E+04+2.3256E-04
 27      1604
 28      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=35_NA/CM2
 29      +4.7800E+04+2.0349E-04+4.7800E+04+2.0349E-04+4.6600E+04+4.0698E-04
 30      1604
 31      LAB_ESP:_SCA=125_FT2/1000ACFM;_J=45_NA/CM2
 32      +4.9400E+04+2.6163E-04+4.9400E+04+2.6163E-04+4.7600E+04+5.2326E-04
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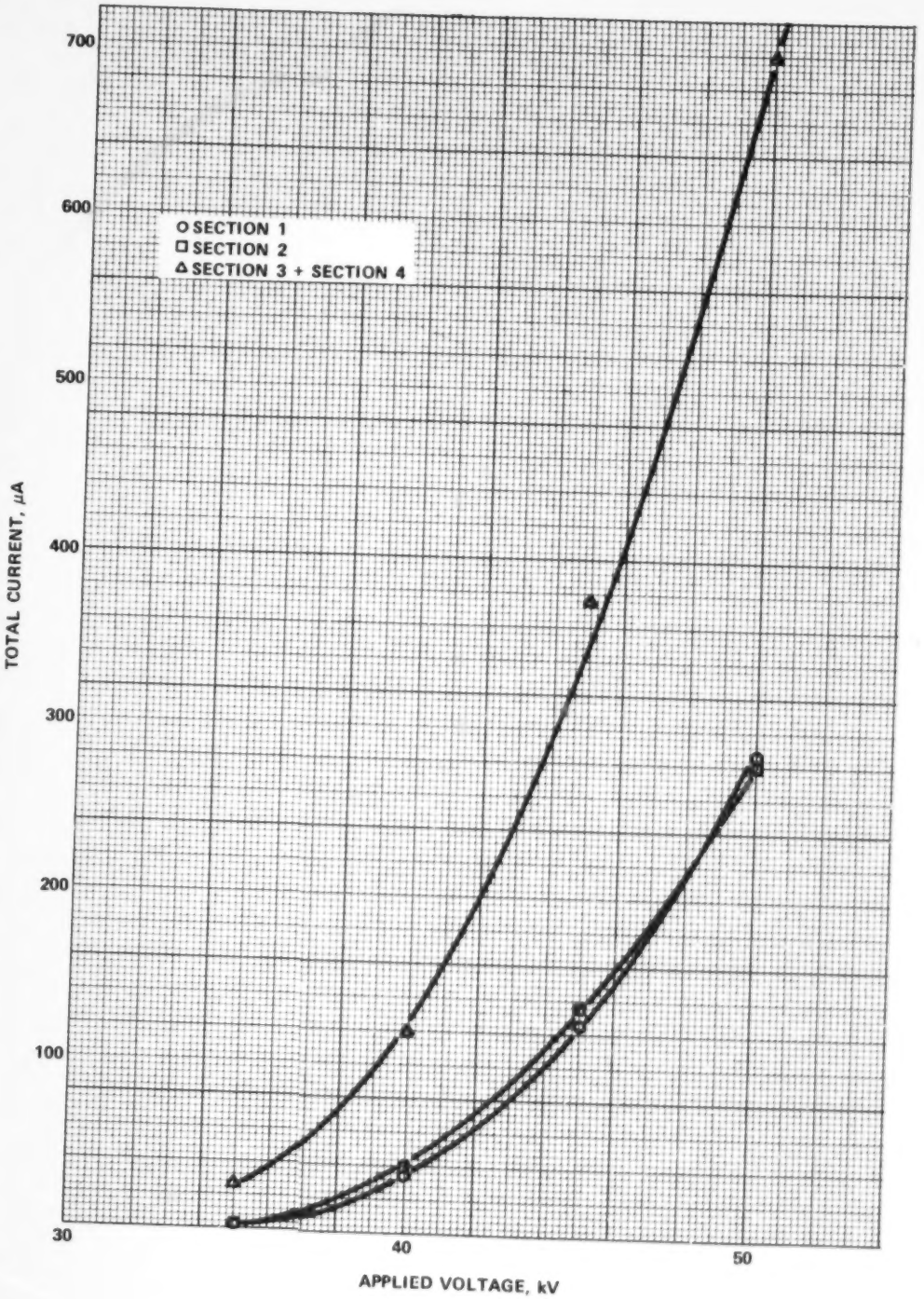

Figure 10: Experimental voltage-current curves used in Example 7.

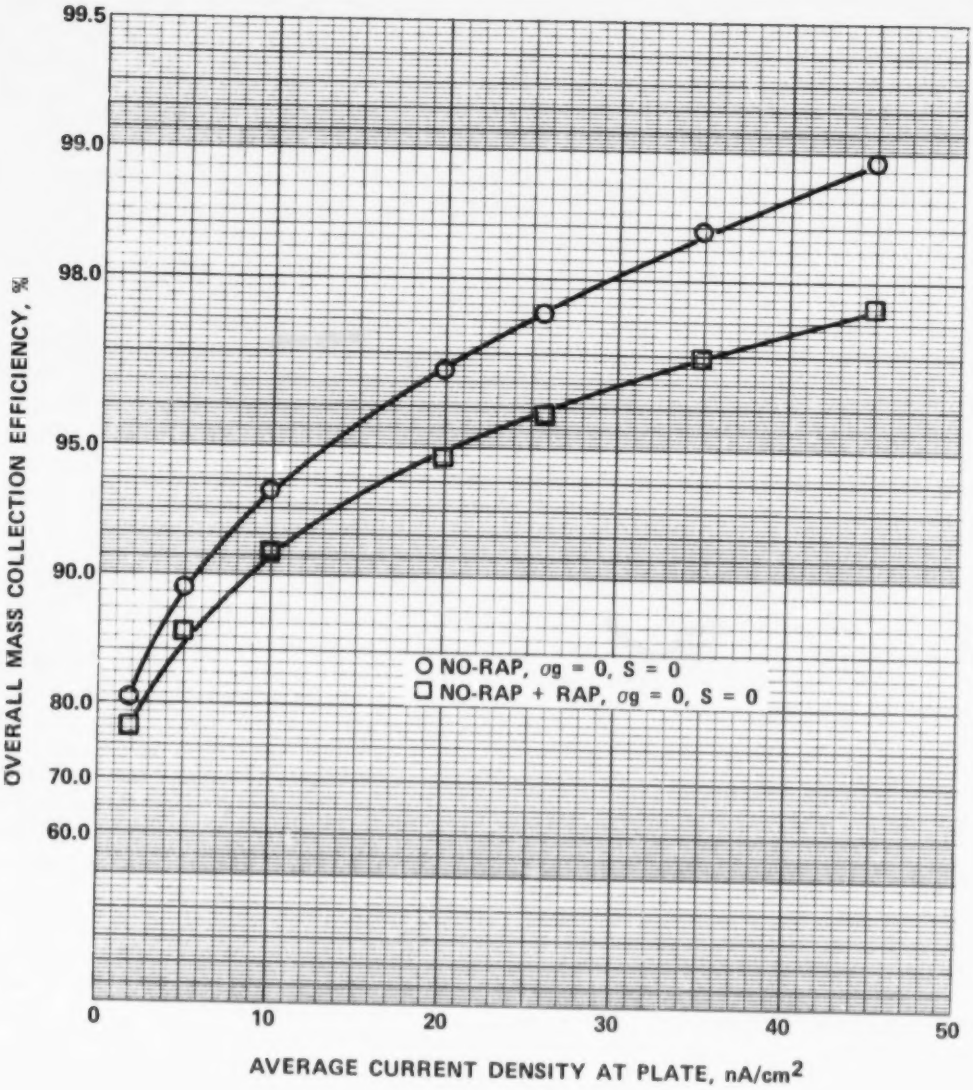

Figure 11: Effect of current density on overall mass collection efficiency.

Comparison of Figures 9 and 11 show that overall mass collection efficiency varies more slowly with current density than with specific collection area. The curves in Figure 11 show that if the precipitator is operated at low values of current density, then significantly reduced overall mass collection efficiencies will result. Thus, in designing a precipitator, the effect of possible changes in the allowable current density due to changes in the material being collected must be taken into account. If reduced current densities are a possibility, then the possible reduction in collection efficiency must be compensated for by an excess in specific collection area (or, more appropriately, collection plate area). The curves in Figure 10 also show that more mass will exit the precipitator due to rapping reentrainment for the lower values of current density than the higher values. At 2 nA/cm^2, the model predicts that approximately 3.1% of the mass entering the precipitator will exit due to rapping reentrainment whereas, at 45 nA/cm^2, approximately 1.3% of the mass entering the precipitator will exit due to rapping reentrainment. Thus, when considering the effect of reductions in current density on precipitator performance, one must take into account not only fundamental reductions in collection efficiency due to lowered migration velocities but also possible increased reductions due to increased rapping reentrainment.

EFFECT OF NONIDEAL CONDITIONS

The effects on precipitator performance of nonuniform gas velocity distribution, gas bypassage of electrified regions, and particle reentrainment must be considered in simulating the operation of an existing precipitator or in designing a new precipitator. In many instances, poor performance of a precipitator can be traced to either one or a combination of these nonideal conditions. Although these nonideal conditions can not be completely avoided, their effects should be minimized in order to achieve good performance. The normalized standard deviation of the gas velocity distribution should have a value of 0.25 or less. The fraction per baffled section of gas bypassage and/or collected mass reentrained without rapping should have a value of 0.1 or less. In order to obtain high efficiencies, the number of baffled sections should be at least four. Testing should be performed in order to optimize the rapping intensity and schedule and to minimize the amount of mass which is reentrained.

The computer program for the model allows the user to easily examine the effects of various nonideal conditions on precipitator performance with one basic data set. The effect of up to 10 different log-normal "rapping puff" particle size distributions can be analyzed for a given set of precipitator parameters by designating the MMD and σ_p for each. For each "rapping puff" particle size distribution, the effect of up to 15 different combinations of σ_g and S on the no-rap and no-rap + rap performance can be obtained. The maximum amount of information concerning nonideal conditions can be obtained with little additional use of computer time.

Example 8

In this example, the effect of various sets of nonideal conditions on the overall mass collection efficiency is examined using the geometry and operating conditions in Example 3. In addition, the operating current density in each electrical section is theoretically determined by generating a clean-gas, voltage-current curve for the first electrical section only and holding the applied voltage fixed in each electrical section at the average value of 41.6 kV. In order to speed up the calculations, particle charge is determined by using the sum of the charges from classical field and diffusional charging theories.

The effect on overall mass collection efficiency of nine different log-normal "rapping puff" particle size distributions was obtained by specifying eight pairs (MMD, σ_p) of MMD and σ_p along with the values (6.0, 2.5) stored in the program. The eight pairs had values of (2.0, 2.5), (10.0, 2.5), (15.0, 2.5), (20.0, 2.5), (10.0, 1.5), (10.0, 5.0), (10.0, 10.0), and (10.0, 15.0). The effect on overall mass collection efficiency of nine different pairs (S, σ_g) of S and σ_g was also obtained for (0.00, 0.00), (0.10, 0.25), (0.30, 0.25), (0.50, 0.25), (0.70, 0.25), (0.10, 0.10), (0.10, 0.40), (0.10, 0.60), and (0.10, 0.80). Table 11 gives the input data card set which was used to perform the calculations. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 5,001 seconds. The output data from the computer program are given in Appendix H.

An effective ion mobility of 2.7×10^{-4} $m^2/V\text{-sec}$ and a roughness factor of 0.85 were used in the calculations which predict the voltage-current characteristics and the electrical operating conditions. Using these parameters, the average current densities at the plate in successive electrical sections were calculated to be 12.6, 18.3, and 23.2 nA/cm^2. These compare with the measured values of current density of 11.1, 17.6, and 22.7 nA/cm^2, respectively, that were obtained at applied voltages of 40.6, 42.1, and 42.45 kV, respectively. The collection efficiencies predicted here are somewhat less than those predicted in Example 3 due to the factors already discussed in Example 2.

The curves shown in Figure 12 point out the importance of careful mechanical design and optimization of gas flow properties. As these curves show, severe nonuniformity of the gas velocity distribution and/or a large degree of gas sneakage will result in serious degradation of precipitator performance. Figures 13 and 14 demonstrate the effect that the particle size distribution of the material reentrained due to rapping can have on the particle size distribution of the total emissions at the outlet of the precipitator when $\sigma_g = 0.25$ and $S = 0.1$. In obtaining the curves shown in these figures, the total mass at the outlet due to rapping reentrainment has been held fixed and only the particle size distribution of the "rapping puff" has been varied. Thus,

TABLE 11. INPUT DATA CARD SET FOR EXAMPLE 8

CARD NUMBER	COLUMN NUMBER 1234567890123456789012345678901234567890123456789012345678901234567890123456789 0
1	1401
2	PLANT_A:_SCA=243FT2/1000ACFM;VO=41.7KV;CALC._V-I;ANALYSIS_OF_NONIDEAL_EFFECTS
3	010102151501010901010 9
4	2002200101
5	1.966___27.0____99.6____2270.0__100.0___1.2_____0.00022_1.0_____1500000.5.00E+10
6	2.002.5010.02.5015.02.5020.02.5010.01.5010.05.0010.010.010.015.0
7	0.000.004.000.100.254.000.300.254.000.500.254.000.700.254.000.100.104.00
8	0.100.404.000.100.604.000.100.804.00
9	0.10____0.30____0.50____0.90____1.30____1.90____3.10____3.90____5.10____6.90
10	10.10___14.90___25.10___29.90
11	0.0_____0.033___0.286___1.189___2.004___3.524___7.048___8.70____10.352__12.334
12	15.638__20.484__32.599__100.0
13	03151515
14	+2.6460E+04+4.1700E+04+2.7300E-01+1.5720E+04+8.2500E-02+5.5000E+00+1.2000E+01
15	+3.6000E+00+3.2724E+05+4.1000E+00+3.1500E+02+1.0000E+00+2.2900E-05+6.0000E-01
16	+8.5000E-01+1.0000E-04+5.0000E-05+5.0000E-05+3.6000E+04
17	+2.6460E+04+4.1700E+04+2.7300E-01+1.5720E+04+8.2500E-02+5.5000E+00+1.2000E+01
18	+3.6000E+00+3.2724E+05+4.1000E+00+3.1500E+02+1.0000E+00+2.2900E-05+6.0000E-01
19	+8.5000E-01+1.0000E-04+5.0000E-05+5.0000E-05+3.6000E+04
20	+2.6460E+04+4.1700E+04+2.7300E-01+1.5720E+04+8.2500E-02+5.5000E+00+1.2000E+01
21	+3.6000E+00+3.2724E+05+4.1000E+00+3.1500E+02+1.0000E+00+2.2900E-05+6.0000E-01
22	+8.5000E-01+1.0000E-04+5.0000E-05+5.0000E-05+3.6000E+04

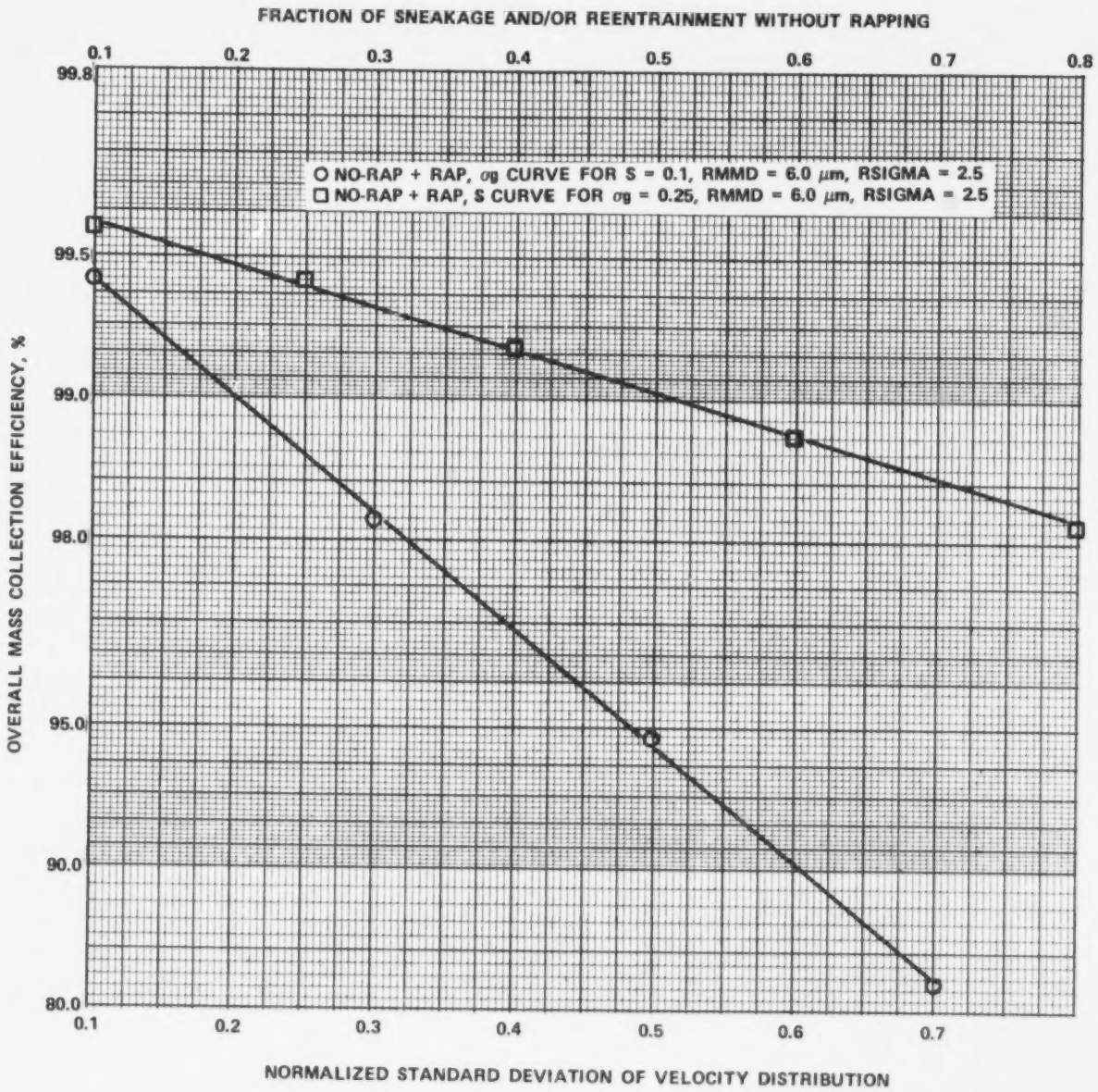

Figure 12: Effects of nonideal conditions on overall mass collection efficiency.

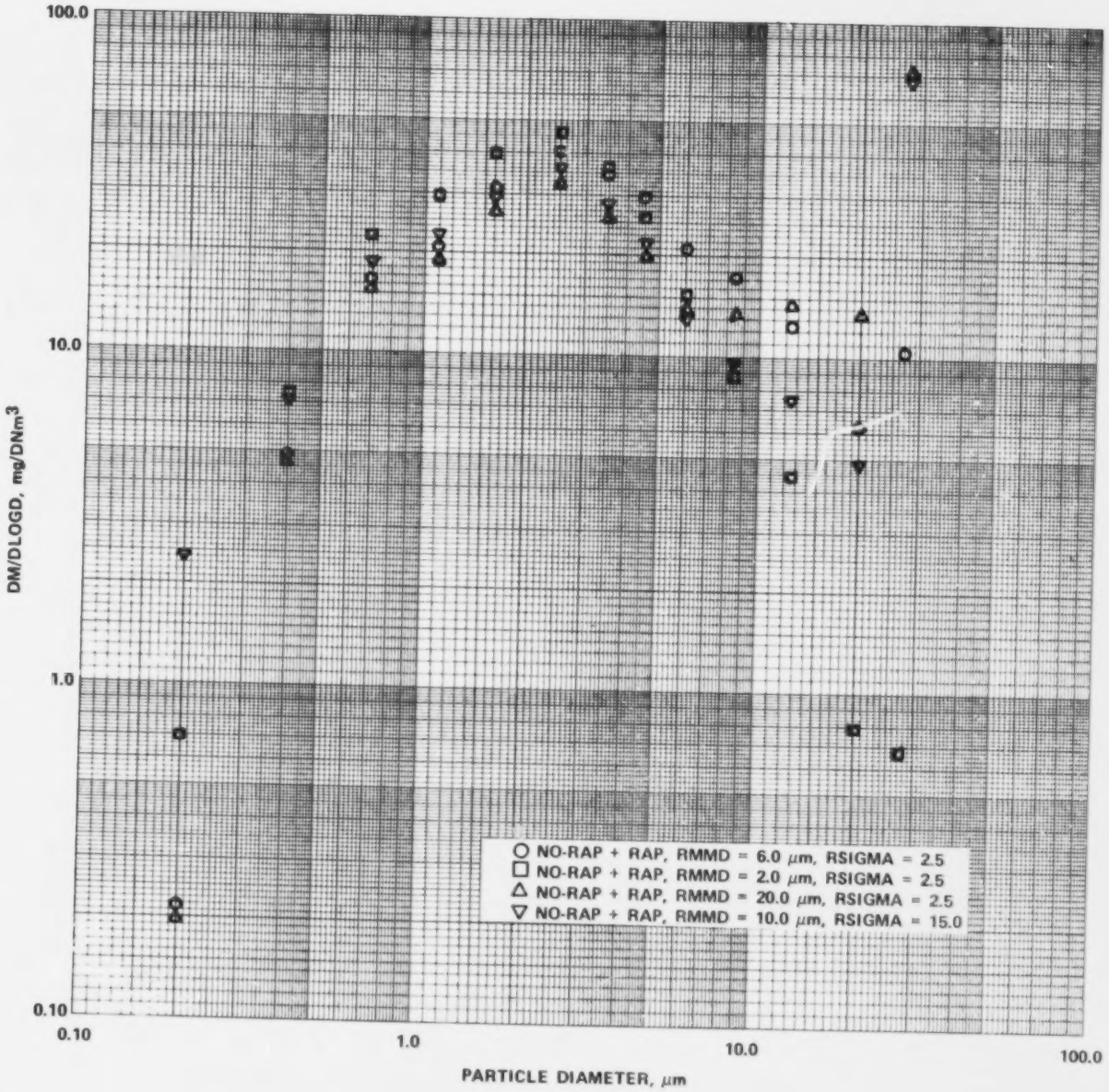

Figure 13: Distribution of mass in the total outlet emissions for different particle size distributions in the 'rapping puff'.

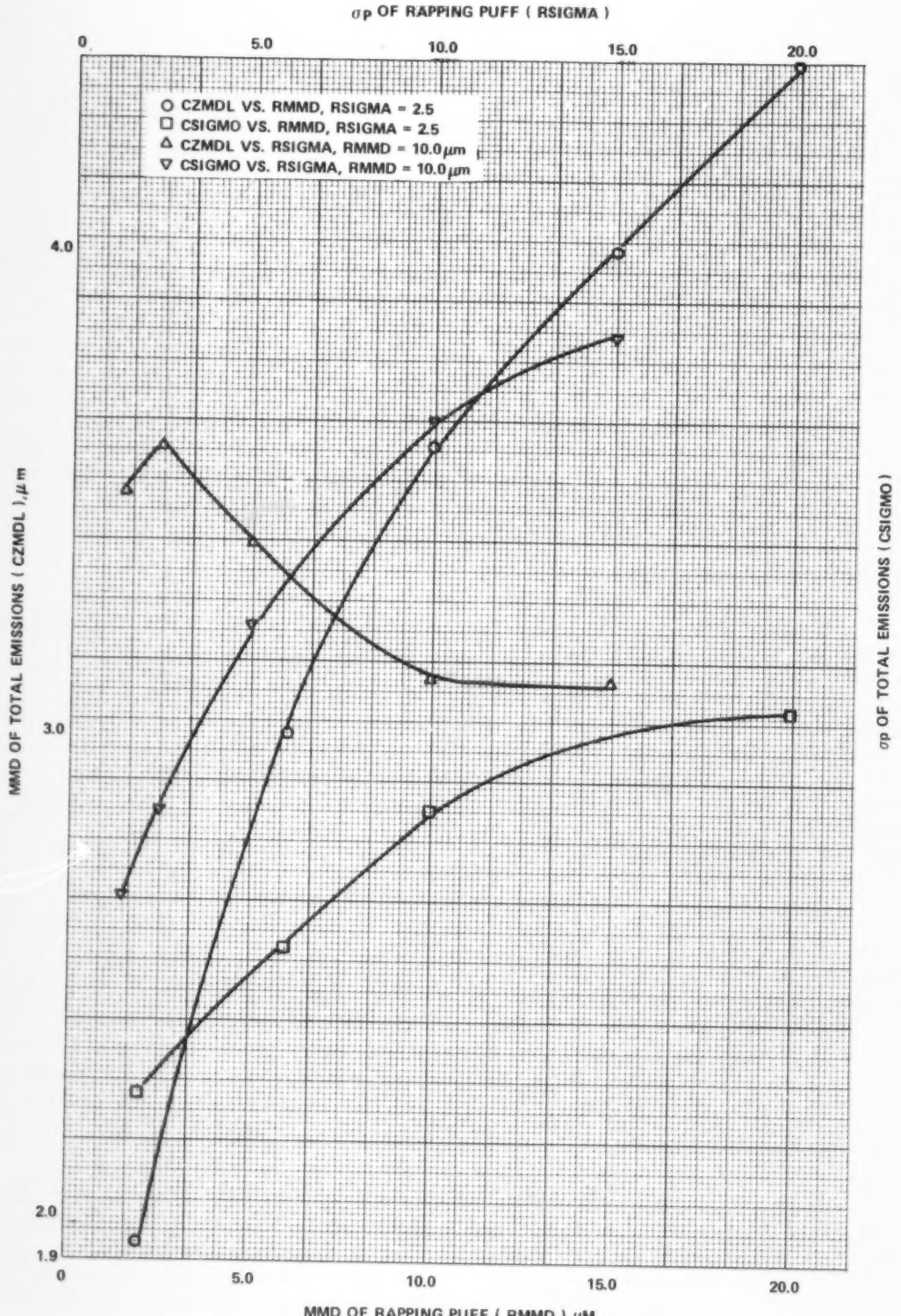

Figure 14: Effects of the 'rapping puff' particle size distribution on the particle size distribution of the total emissions.

the overall mass collection efficiency remains the same but the particle size distribution at the outlet varies. This type of analysis is important when the opacity due to the outlet emissions is of interest since the opacity will depend on the amount and the particle size distribution of the mass exiting the precipitator. In certain cases, the outlet mass standard can be met with the opacity being far out of compliance. For these cases, the quantity and particle size distribution of the mass due to rapping reentrainment is very important in determining the opacity. Figure 13 shows the distribution of mass in the total outlet emissions for different particle size distributions in the "rapping puff". Depending on the resulting MMD and σ_p, these changes in the distribution of mass in the outlet emissions can have a significant effect on the opacity. Figure 14 shows several curves which demonstrate the effect that the "rapping puff" particle size distribution can have on the particle size distribution of the total emissions. These possible shifts in MMD and σ_p of the outlet emissions due to rapping reentrainment are large enough to produce significant changes in opacity.

EFFECT OF RESISTIVITY

In many instances, the useful operating current density in a precipitator is limited by the resistivity of the collected particulate layer. If the resistivity of the collected particulate layer is sufficiently high, electrical breakdown of the layer will occur at a value of current density which in most cases is undesirably low. Depending on the value of the applied voltage, the breakdown of the collected particulate layer will result in either a condition of sparking or the formation of stable back corona from points on the particulate layer. Excessive sparking and back corona are detrimental to precipitator performance and should be avoided.

Figure 15 shows an experimentally determined relationship between maximum allowable current density and resistivity.[7] It points out the severe drop in maximum allowable current density as the resistivity increases over the range $0.5 - 5.0 \times 10^{11}$ ohm-cm. With Figure 15 and known or calculated voltage-current characteristics, the effect of resistivity on the overall mass collection efficiency that can be obtained for a fixed geometry and specific collection area can be determined by using the mathematical model of electrostatic precipitation.

Example 9

Once the overall mass collection efficiency is determined as a function of current density for a given precipitator geometry and specific collection area, then the performance of the precipitator can easily be determined as a function of resistivity. In this example, the results from Example 7 and Figure 15 are used to illustrate the effect that the resistivity

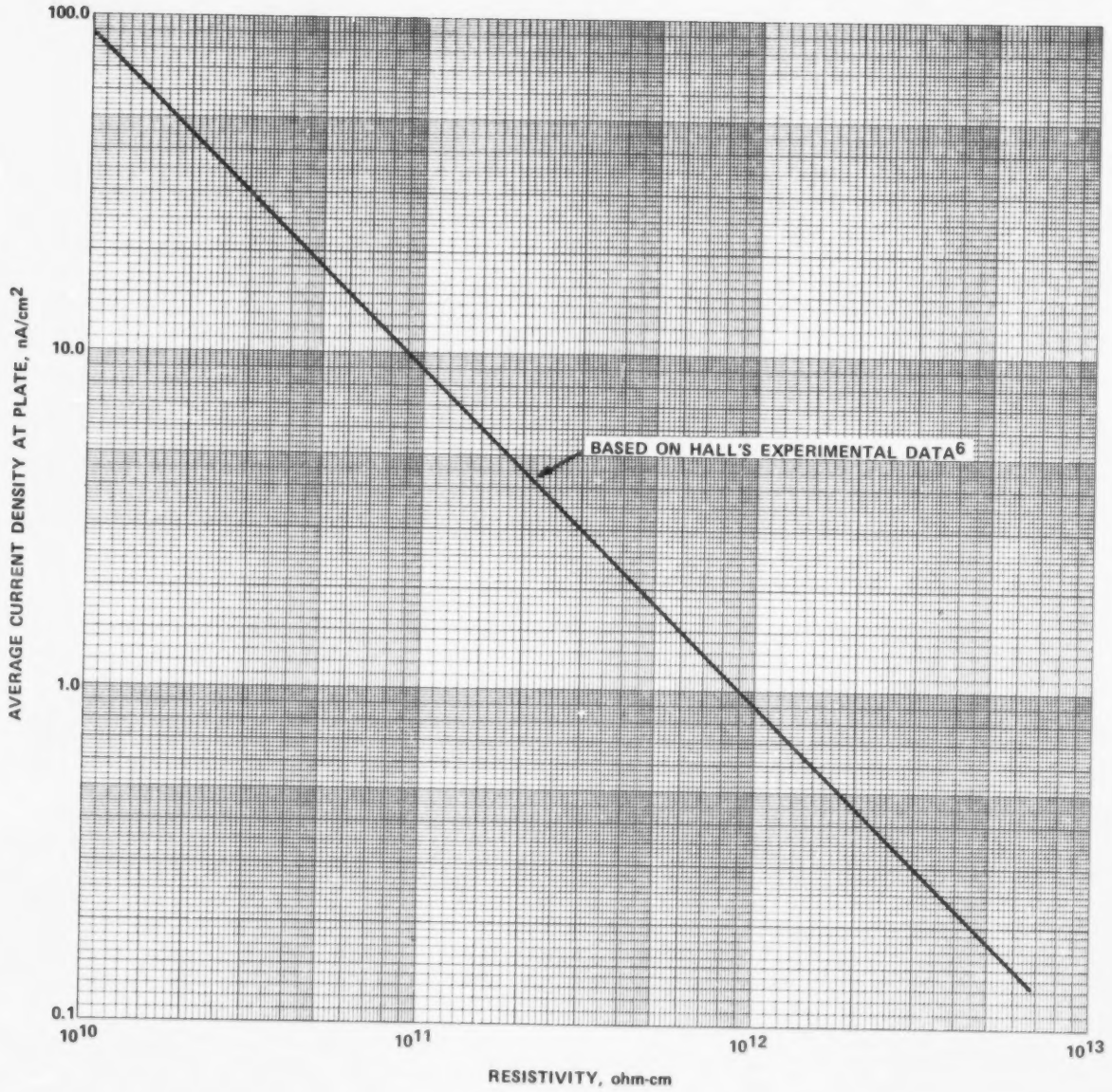

Figure 15: Experimentally determined effect of resistivity on allowable current density in a precipitator.

of the collected particulate layer can have on the performance of a given precipitator. Figure 16 shows the effect that resistivity would have on the overall mass collection efficiency for the precipitator and conditions in Example 7. In obtaining the curves, resistivities of 0.2, 0.26, 0.35, 0.45, 0.90, 1.8, and 4.5 (x 10^{11} ohm-cm) were taken to limit maximum allowable current densities to values of 45.0, 35.0, 25.8, 20.0, 10.0, 5.0, and 2.0 nA/cm^2, respectively.

The curves in Figure 16 show the dramatic effect that changes in resistivity can have on precipitator performance. If we assume that the precipitator in this example is operating under the most favorable electrical conditions possible, the NO-RAP overall mass collection efficiency would drop from 98.8% to 80.8% if the resistivity of the collected particulate layer increased from 2 x 10^{10} to 4.5 x 10^{11} ohm-cm. This example points out why a knowledge of the resistivity of the collected particulate layer is crucial in designing a precipitator. The problem is made even more difficult since the resistivity can change significantly with changes in the composition, moisture content, and temperature of the flue gas. In addition, changes in resistivity due to changes in the material producing the emissions must also be considered. Thus, in designing a precipitator, proper allowance must be made to account for possible values of resistivity that are larger than that anticipated.

USE OF THE ESTIMATION PROCEDURE

The mathematical model of electrostatic precipitation provides the option of using an estimation procedure to predict precipitator performance. When only gross trends are desired or a starting point for the more rigorous calculation is needed, the use of this option can save considerable amounts of computer time. The details of the estimation procedure are presented in Volume 1 and will not be discussed here. If a user plans to make extensive use of the estimation procedure, he should refer to Volume 1 in order to acquire an understanding of the basis for the procedure. Although judicious use of the estimation procedure can be quite beneficial to the user, it can not be assumed that predictions from this procedure will always be close to those of the more rigorous calculation. Thus, all final simulations and final designs should be obtained by using the more rigorous calculation.

Example 10

In this example, the operation of the hot-side precipitator in Example 4 is simulated using the estimation procedure. Table 12 gives the input data card set which was used to perform the calculations. The computation time required to run this example on the DEC PDP 15/76 computer was approximately 263 seconds. In this case, the estimation procedure runs 18 times as fast as

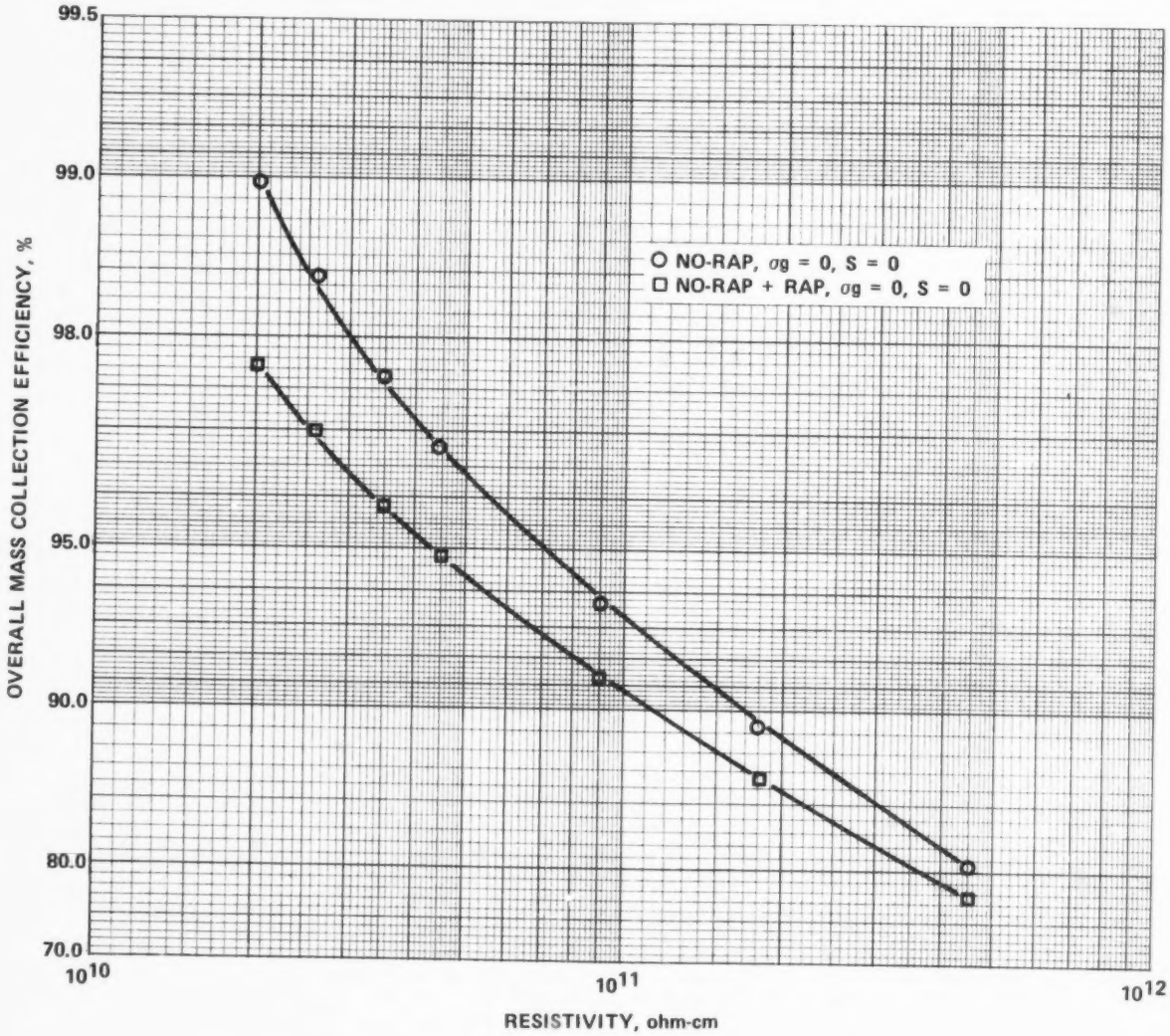

Figure 16: Effect of resistivity on overall mass collection efficiency.

TABLE 12. INPUT DATA CARD SET FOR EXAMPLE 10

CARD NUMBER	COLUMN NUMBER 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
1	1 5 0 1
2	F U L L - S C A L E , H O T - S I D E _ E S P : _ P L A N T _ B ; S C A = 3 9 0 F T 2 / 1 0 0 0 A C F M ; J = 3 4 . 3 U A / F T 2 ; E S T . _ P R O C E D .
3	0 2 0 1 0 1 1 0 1 0 0 3 0 1 0 1 0 1 0 2 0 2
4	2 . 5 1 _ _ _ _ 3 6 . 0 _ _ _ _ 9 9 . 6 _ _ _ _ 2 2 7 0 . 0 _ _ 1 0 0 . 0 _ _ _ 1 . 2 _ _ _ _ _ 0 . 0 0 0 2 2 _ 1 . 0 _ _ _ _ _ 1 5 0 0 0 0 0 . 1 . 9 0 E + 1 0
5	0 . 0 0 0 . 0 0 4 . 0 0 0 . 1 0 0 . 2 5 4 . 0 0
6	0 . 2 0 _ _ _ _ 0 . 4 0 _ _ _ _ 0 . 7 0 _ _ _ _ 1 . 0 0 _ _ _ _ 1 . 5 0 _ _ _ _ 2 . 0 0 _ _ _ _ 3 . 0 0 _ _ _ _ 4 . 0 0 _ _ _ _ 5 . 0 0 _ _ _ _ 7 . 0 0
7	1 0 . 0 0 _ _ _ 1 5 . 0 0 _ _ _ 2 5 . 0 0 _ _ _ 3 0 . 0 _ _ _ _ 1 0 0 . 0
8	0 . 0 _ _ _ _ _ 0 . 1 4 7 9 _ _ 0 . 5 7 4 2 1 _ 1 . 0 0 9 2 2 _ 1 . 7 2 2 6 4 _ 2 . 7 4 9 2 6 _ 6 . 5 2 5 1 4 _ 9 . 4 8 3 2 1 _ 1 1 . 1 3 6 2 5 1 3 . 0 5 0 2 9
9	1 5 . 6 2 5 5 5 2 0 . 1 8 4 4 5 3 0 . 9 7 2 6 9 3 5 . 4 9 6 7 9 1 0 0 . 0
10	0 4 0 9 0 9 0 9 0 9
11	+ 4 . 2 1 2 0 E + 0 4 + 3 . 5 8 8 0 E + 0 4 + 1 . 2 2 0 0 E + 0 0 + 5 . 6 1 6 0 E + 0 4 + 5 . 4 5 0 0 E - 0 2 + 4 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
12	+ 4 . 5 0 0 0 E + 0 0 + 4 . 3 2 0 7 E + 0 5 + 3 . 7 9 5 8 E + 0 0 + 6 . 2 4 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 8 0 0 0 E - 0 5 + 1 . 0 0 0 0 E + 0 0
13	+ 4 . 2 1 2 0 E + 0 4 + 3 . 3 9 5 0 E + 0 4 + 1 . 6 7 2 0 E + 0 0 + 5 . 6 1 6 0 E + 0 4 + 5 . 4 5 0 0 E - 0 2 + 4 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
14	+ 4 . 5 0 0 0 E + 0 0 + 4 . 3 2 0 7 E + 0 5 + 3 . 7 9 5 8 E + 0 0 + 6 . 2 4 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 8 0 0 0 E - 0 5 + 1 . 0 0 0 0 E + 0 0
15	+ 4 . 2 1 2 0 E + 0 4 + 2 . 9 1 3 0 E + 0 4 + 1 . 4 2 0 0 E + 0 0 + 5 . 6 1 6 0 E + 0 4 + 5 . 4 5 0 0 E - 0 2 + 4 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
16	+ 4 . 5 0 0 0 E + 0 0 + 4 . 3 2 0 7 E + 0 5 + 3 . 7 9 5 8 E + 0 0 + 6 . 2 4 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 8 0 0 0 E - 0 5 + 1 . 0 0 0 0 E + 0 0
17	+ 4 . 2 1 2 0 E + 0 4 + 2 . 7 5 0 0 E + 0 4 + 1 . 4 6 0 0 E + 0 0 + 5 . 6 1 6 0 E + 0 4 + 5 . 4 5 0 0 E - 0 2 + 4 . 5 0 0 0 E + 0 0 + 1 . 2 0 0 0 E + 0 1
18	+ 4 . 5 0 0 0 E + 0 0 + 4 . 3 2 0 7 E + 0 5 + 3 . 7 9 5 8 E + 0 0 + 6 . 2 4 0 0 E + 0 2 + 1 . 0 0 0 0 E + 0 0 + 2 . 8 0 0 0 E - 0 5 + 1 . 0 0 0 0 E + 0 0

the more rigorous calculation. The output data from the computer program are given in Appendix I.

For this example, the prediction of overall mass collection efficiency by the estimation procedure is essentially the same as that obtained from the more rigorous calculation. Figure 17 shows a comparison of the fractional collection efficiencies and migration velocities obtained from the two methods of calculation. Although slight differences exist in the predicted fractional collection efficiencies, even significantly different inlet particle size distributions would not lead to any appreciable disagreement in overall mass collection efficiencies predicted from the two methods of calculation. The good agreement between the estimation procedure and the rigorous calculation can be attributed to the agreement in the values of the electric field at the plate. For the rigorous calculation, the values of average electric field at the plate in successive electrical sections are 1.70, 1.72, 1.53, and 1.51 ($\times 10^5$ V/m) whereas, for the estimation procedure, the corresponding values are 1.79, 1.70, 1.46, and 1.38 ($\times 10^5$ V/cm), respectively. The estimated values of the electric field at the plate provide the greatest uncertainty in the estimation procedure and the type of agreement obtained in this example can not always be expected.

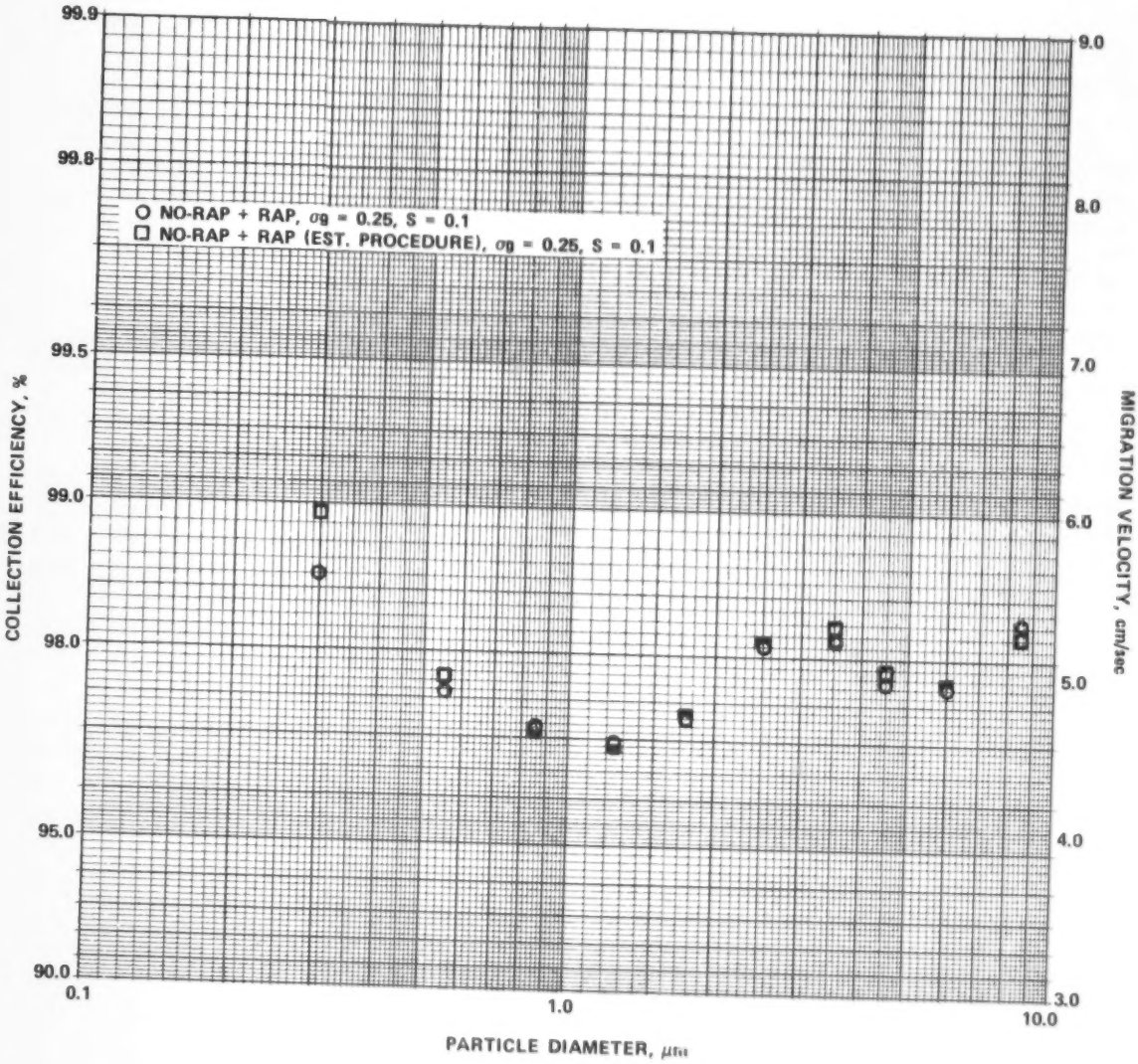

Figure 17: Comparison of results obtained from rigorous application of the model and the estimation procedure.

SECTION 8

USE OF THE MODEL FOR TROUBLESHOOTING

The mathematical model of electrostatic precipitation can be used as a tool in troubleshooting precipitators that are not meeting the overall mass collection efficiency which is expected or anticipated. When using the model for troubleshooting, certain experimental data should be obtained in order to properly utilize the model. These data include operating voltages and currents in the different electrical sections, inlet mass loading and particle size distribution, ash resistivity, average gas flow rate and velocity, and average gas temperature and pressure. By using these limited experimental data, the geometry of the precipitator, and the mathematical model, certain steps which are given below can be taken in an attempt to diagnose the possible reason or reasons for the level of performance of the precipitator.

Step 1: Determine optimum collection efficiency.

Use the model to simulate the operation of the precipitator under ideal, no-rap conditions ($\sigma_g = 0$ and $S = 0$) with the actual operating parameters. This calculation establishes the optimum overall mass collection efficiency that can be expected under the given operating conditions. It should be noted that this optimum efficiency may not always represent the best performance of the precipitator since accumulation of material on the discharge and collection electrodes, broken discharge electrodes, electrode misalignment, or operation of the precipitator at lower than permissible voltages and currents would result in less than optimum electrical operating conditions. If possible, measures should be taken to ensure that the electrical conditions in the precipitator are at their best when obtaining data for use in the troubleshooting procedure. In any event, the starting point in the troubleshooting procedure can be taken to be the calculated optimum efficiency under the actual operating conditions.

Step 2: Check to see if the calculated optimum efficiency is equal to or less than the measured value.

If the calculated optimum value of efficiency is equal to or less than the measured value, the precipitator can be assumed to be performing as well as possible for the given set of operating conditions. Changes in the inlet particle size distribution,

the electrical operating conditions, or the gas volume flow can result in a reduction in collection efficiency for a given precipitator even though the precipitator is performing at its best. Thus, in certain cases, a precipitator may not be able to attain the overall mass collection efficiency it once achieved or was designed to achieve solely due to a change in the process variables. As a consequence, the precipitator may no longer be sized properly for the operating conditions encountered. The options that are available for improving the performance of the precipitator are limited to the possible improvement of the electrical operating conditions or a reduction in the gas flow rate through the precipitator.

Step 3: Check to see if the calculated optimum efficiency is only a little larger than the measured value.

If the calculated optimum value of efficiency is only a little larger than the measured value, the precipitator is probably functioning well but nonideal conditions are having some effect on the performance. In this case, calculations should be made with the model in order to obtain NO-RAP + RAP overall mass collection efficiencies for various small values of σ_g and S and the rapping reentrainment parameters which are built into the computer program. If the measured efficiency can be predicted by the model with values of $\sigma_g \leq 0.25$ and $S \leq 0.1$, it is questionable whether or not improvements in the gas flow properties and mechanical design will result in an appreciable improvement in precipitator performance. A less costly and possibly more profitable exercise would be to vary the rapping intensities and frequencies in an attempt to minimize losses in collection efficiency due to rapping reentrainment. If $\sigma_g > 0.25$ or $S > 0.1$, these quantities should be measured. If the measured values of σ_g and S are consistent with those predicted by the model, the gas flow properties and mechanical design should be improved.

Step 4: Check to see if the calculated optimum efficiency is significantly larger than the measured value.

If the calculated optimum value of efficiency is significantly larger than the measured value, the precipitator is functioning poorly. Poor performance of a precipitator may be due to either one or a combination of several factors than can be analyzed with the model. These factors include the electrical operating conditions, nonuniform gas velocity distribution, gas bypassage of electrified regions, particle reentrainment without rapping, and rapping reentrainment. In the following steps, procedures are outlined that can be taken in an attempt to pinpoint the problem areas.

Step 5: Determine whether or not the operating currents are completely useful in the precipitation process.

At this point, the electrical operating conditions should be examined in order to determine whether or not the operating currents are completely useful in the precipitation process. If excessive sparking or back corona is occurring in the precipitator, the measured currents will not be totally useful in the precipitation process and, in fact, the nature of the currents may be very detrimental to precipitator performance. Use in the model of currents measured under these conditions will result in the prediction of much higher collection efficiencies than will be attained by the precipitator.

Step 5(a): Check for excessive sparking.

Sparking results in localized currents that are not very effective in charging particles. In addition, excessive sparking can lead to increased particle reentrainment by producing disruptions at the surface of the collected particulate layer and by producing reduced holding forces over large regions of the collected layer due to reduced currents to these regions.

If sparking is occurring, the extent of the sparking should be determined by using spark rate meters or other appropriate instrumentation. If excessive sparking is occurring, the applied voltage should be lowered until the spark rate is at a level which is not detrimental to the performance of the precipitator. Although the operating voltages and currents will be reduced, the performance of the precipitator will improve and the use of these operating electrical conditions in the model will give better agreement between predicted and measured collection efficiencies.

Step 5(b): Check for the existence of back corona.

If excessive sparking is not occurring, a check should be made to determine whether or not a condition of back corona exists in the precipitator. When back corona exists, both positive and negative ions move in the interelectrode space and this results in a reduction in the negative charge that can be acquired by a particle.

Two methods can be used to check for the existence of back corona. First, the measured value of ash resistivity and Figure 15 can be used to estimate the maximum allowable current density. If the current density in the precipitator greatly exceeds this value, the precipitator is probably operating in back corona. As a second method of checking for the existence of back corona, the voltage-current curves for the different electrical sections can be checked to see if at some point on the curve increased current is obtained at a reduced applied voltage. If this is

the case and the precipitator is operating in this region of the voltage-current curve, then back corona is occurring in the precipitator.

If back corona is occurring, the applied voltage should be lowered in order to obtain a current density which will not lead to the formation of back corona. The reduced voltages and currents will result in improved performance of the precipitator and the use of these operating electrical conditions in the model will give better agreement between predicted and measured collection efficiencies.

Step 5(c): Consider electrode misalignment.

As a further consideration concerning the electrical conditions, the electrode alignment should be taken into account. Consideration of electrode alignment is especially important when troubleshooting hot precipitators. In hot precipitators, the collection plates may buckle if proper precautions have not been taken to allow for the expansion of the plates at the elevated temperatures. If buckling of the plates occurs, higher currents will be measured but they will be localized. Currents of this type are not desirable for treating particles. The existence of this type of misalignment should be evidenced by steep voltage-current curves with a narrow voltage range from corona initiation to sparkover. Use in the model of measured currents obtained from this type of situation will result in predicted collection efficiencies that are well above those which are attained.

Step 6: Estimate the effect that various nonideal conditions could have on the performance of the precipitator.

If the poor performance of the precipitator can not be traced to the electrical operating conditions, then the nonideal effects of nonuniform gas velocity distribution, gas bypassage of electrified regions, and particle reentrainment should be considered next. The effect of σ_g and S on the NO-RAP + RAP overall mass collection efficiency of the precipitator should be analyzed in a systematic fashion with the model.

Step 6(a): Estimate the possible effect of nonuniform velocity distribution on the performance of the precipitator.

In order to determine whether or not a nonuniform gas velocity distribution could be responsible for the poor performance of the precipitator, calculations should be made for $S = 0$ and values of σ_g ranging from 0 to at least 2.0. If a certain value of σ_g in the chosen range produces the necessary reduction in collection efficiency and this value is not completely out of line with available information concerning the gas flow, interfacing of the precipitator with the duct work, existence of gas diffusion plates, etc., then the actual value of σ_g should be determined experimentally by making a velocity traverse in a plane at the inlet

of the precipitator. If the measured value of σ_g is greater than 0.25, measures should be taken to improve the gas flow distribution.

Step 6(b): Estimate the possible effect of gas sneakage and/or particle reentrainment without rapping on the performance of the precipitator.

In order to determine the extent of gas bypassage of the electrified regions and/or particle reentrainment without rapping that would be necessary to cause the poor performance of the precipitator, calculations should be made for $\sigma_g = 0$ and values of S ranging from 0 to 0.9. There will be a value of S in this range that will result in the necessary reduction in collection efficiency. Depending on the value of S, different interpretations can be made. If S is not too large ($S \leq 0.2$), then the poor performance might be attributed to either excessive gas bypassage of the electrified regions or excessive particle reentrainment without rapping or very poor gas velocity distribution or a combination of all three of these effects where neither effect alone is very detrimental to the performance of the precipitator. In this case, measurements should be made under air-load conditions to determine σ_g and the fraction of the gas volume flow passing through non-electrified regions in each baffled section. If the measured values of these quantities are such that they can account for a major part of the reduction in collection efficiency, then the appropriate corrective measures can be made to the mechanical design of the precipitator. If the measured values of these quantities are such that they can not account for a major part of the reduction in collection efficiency, then it is possible that particle reentrainment without rapping is having an adverse effect on the performance of the precipitator. This could be due to factors which include a high average gas velocity, a very non-uniform gas velocity distribution, a low value of ash resistivity, excessive sparking, low operating current densities, and hopper problems. All of these factors can lead to particle reentrainment from causes other than rapping and should be taken into account in the troubleshooting analysis.

If S is large ($S > 0.2$), the poor performance of the precipitator is probably due primarily to extremely excessive particle reentrainment. This could be a result of one or more of the same factors mentioned above. In this case, reentrainment of particles from the hoppers, caused by poor gas flow qualities or by hopper malfunctions, should receive more serious attention as a possible cause of the poor performance. If very large values of S are needed to predict the reduction in collection efficiency, then it is also possible that rapping reentrainment is occurring to a much greater extent than that predicted by the rapping reentrainment calculation and that this is reflected in the value of S. If the value of S is large, then hopper operation should be checked, outlet mass loadings should be obtained with and without rapping,

and real-time measurements of the outlet mass loading should be made. These measures should indicate whether the problem is due to hopper operation or rapping reentrainment or reentrainment without rapping or some combination of the three.

The troubleshooting procedure described above can be a valuable tool in helping to diagnose the causes of poor performance of a precipitator. Since the procedure involves only limited experimental data, it is not costly to perform. Use of the procedure can also result in time and cost savings by giving direction and helping to focus on those quantities which actually need to be measured. A further benefit of using the procedure is the possibility that costly modifications to the precipitator that will not result in significant improvement in the performance can be avoided.

SECTION 9

USE OF THE MODEL FOR SIZING OF PRECIPITATORS

The mathematical model of electrostatic precipitation can be used as a guide in sizing precipitators. Although this method of sizing precipitators can be very successful, care must be taken to ensure proper usage of the model and to prevent the use of erroneous input data. Misuse of the model could result in a large error in sizing a precipitator.

When using the model for the purpose of sizing a precipitator, certain data which are used as input to the model should be obtained from measurements made using the actual gas stream or one which will be very similar to the actual gas stream. If a gas stream other than the actual one is used to obtain representative data, steps should be taken to assure that the process variables producing the effluent gas stream and particles are not too different. Also, it is very important that the temperature and composition of the gas stream be close to that which will be experienced in the precipitator to be sized.

The following is a list and discussion of those quantities whose values should be determined from measurements under conditions similar to those which will be experienced in the precipitator to be sized:

- The temperature, pressure, and composition of the gas stream should be measured.

- The particle size distribution and mass loading in the gas stream should be measured at a location from the source that would be representative of where the gas stream would enter the precipitator.

- The bulk resistivity of the particles should be measured both in situ and in the laboratory. In making these measurements, the gaseous environment must not only be preserved but, in addition, the electric field strength at which the measurements are made must be close to that which will be experienced in the precipitator in order to obtain the appropriate measurement. If agreement can not be obtained between the in situ and laboratory measurement, then the higher of the two values should be used in order to size the precipitator.

- The effective mobility of the negative ions which would be produced during negative corona discharge in the gas stream should be measured.

If any or all of the above quantities are not measured or can not be measured, then their values can only be estimated by using the best data available and prior experience for similar sets of conditions. Using values of these quantities that are not obtained from measurements with the actual or a similar gas stream is risky and these values should be estimated in a conservative manner.

Once the values of the quantities discussed above are determined, the model can be used in a procedure to predict what precipitator sizes are needed to attain various levels of overall mass collection efficiency. The steps which should be taken in this procedure are discussed next.

Step 1: Establish an estimate of the electrical conditions under which the precipitator should operate.

In establishing an estimate of the electrical operating conditions, a determination of the maximum allowable current density should be made first. The maximum allowable current density can be estimated by using the determined value of ash resistivity and the curve given in Figure 15. If voltage-current data are available for similar conditions, then these should also be used in helping to determine the maximum allowable current density.

Once the maximum allowable current density is estimated, then the applied voltages which will produce this current density in the different electrical sections must be estimated. These voltages may be obtained from voltage-current data which are available for similar conditions except it is not necessary that the ash resistivity be duplicated. Alternatively, the model can be used with the option which calculates voltage-current curves for a wire-plate geometry in order to determine voltage-current characteristics with the effect of resistivity being ignored. Then, the applied voltages necessary to produce the maximum allowable current density can be estimated. In utilizing the voltage-current calculation, a value for the roughness factor of the discharge electrodes must be specified. The value of this parameter normally lies between 0.5 and 1.0 and small changes in the value lead to significantly different results. Since the value of this parameter is difficult to project in advance and the value changes during the operation of the precipitator, care must be taken in specifying this value and in analyzing the results obtained. Calculations used to size the precipitator should be made for several values of the roughness factor between 0.5 and 1.0 and the most conservative prediction of precipitator performance should be used as the basis for sizing the precipitator. Also, if values of the roughness factor in a particular range yield results that are obviously out of line with similar applications, then this range should be eliminated from consideration.

Since the ash resistivity is difficult to determine precisely and environmental changes can produce significant changes in its value, the size of a precipitator should be determined based on a maximum allowable current density which is estimated based on a somewhat higher value of resistivity than anticipated. A reasonable and conservative approach might be to base the estimated maximum allowable current density on a value of resistivity that is one-half an order of magnitude greater than the anticipated value.

Step 2: Determine the geometrical parameters to be used.

At this point, the geometrical characteristics of the precipitator should be established since these data are necessary as input to the model. The values of the plate spacing, discharge electrode spacing, and diameter of the discharge electrodes which are used in the model must be the actual values. In order to size the precipitator, it is not necessary to know the actual values of the cross-sectional area, height, area, and number of the plates, length of the electrical sections, or total electrified length. Although the values of these quantities can be chosen arbitrarily, they should be as representative as possible.

In the model, different overall mass collection efficiencies can be determined for different specific collection areas and then, based on the actual gas volume flow through the precipitator, the total collection plate area necessary to achieve a given efficiency can be determined. Knowing the required collection plate area, the precipitator can be designed with respect to cross-sectional area, plate height, and length. In designing the precipitator so that it will have the required collection plate area, certain considerations should be made. First, the height of the collection plates should not be too high since this can lead to increased reentrainment from rapping and to greater difficulty in providing sufficient rapping force to the entire area of the plate. In practice, the height of collection plates ranges from approximately 3.05 (10) to 12.2 (40) meters (feet). Second, the precipitator should be long enough so that it can contain several baffled, independent electrical sections. Increasing the number of baffled electrical sections leads to better operating electrical conditions and reduced losses in collection efficiency due to gas sneakage and hopper boil-up. Third, the gas velocity through the precipitator should be 1.53 m/sec (5 ft/sec) or less in order to help prevent reentrainment without rapping and to allow sufficient residence time to recollect material reentrained due to rapping.

Step 3: Determine the nonideal conditions for which the precipitator will be sized.

Since a certain degree of a gas flow nonuniformity and gas bypassage of electrified regions and/or particle reentrainment

without rapping can be expected to exist in a precipitator, these factors must be considered in sizing the precipitator. Experience in simulating the operation of full-scale, industrial precipitators indicates that values of $\sigma_g = 0.25$ and $S = 0.1$ are appropriate for modeling precipitators which are in good working condition. Losses in overall mass collection efficiency due to rapping reentrainment are built into the model and can not be varied without changing the computer program itself. Since the procedure which determines the effect of rapping reentrainment on precipitator performance is based on average data acquired from six different full-scale precipitators, the effects of rapping reentrainment might not be estimated in a conservative manner.

If a conservative approach is taken in sizing the precipitator, then the values of σ_g and S should be taken to be somewhat higher than 0.25 and 0.1, respectively. Values of $\sigma_g = 0.4$ and $S = 0.2$ should be conservative. This value of S should also allow for above average losses in collection efficiency due to rapping reentrainment. If the precipitator is sized in a conservative manner, then the chances that the precipitator will be able to meet the particulate emissions standards once it is built are improved even though undesirable nonideal conditions exist. As a consequence, the process producing the emissions does not have to be shut down until the problems with the precipitator are diagnosed and corrected. The problems with the precipitator can be diagnosed with the troubleshooting procedure while the precipitator is in operation and appropriate corrective measures can be made during a scheduled shut down. Thus, in many cases, the added cost of a conservative design can be partially or fully recovered.

Step 4: Consider the effect of adverse changes in particle size distribution in sizing the precipitator.

Since any decrease in the mass median diameter or increase in the dispersiveness of the inlet particle size distribution will result in a fundamental reduction in precipitator performance, this factor should be considered in sizing a precipitator. Any changes in the process variables controlling the source of the emissions can result in significant changes in particle size distribution. Thus, the possibility of a change from the anticipated particle size distribution to a less favorable one should be incorporated into the sizing procedure. In a conservative approach, the measured or anticipated inlet particle size distribution can be fit to a log-normal distribution and the fitted mass median diameter and geometric standard deviation can be decreased and increased by 25%, respectively. These new values should then be used in the model in order to obtain the inlet particle size distribution for use in sizing the precipitator.

Step 5: Generate a curve of overall mass collection efficiency versus specific collection area.

At this point, since all appropriate input data have been measured or can be determined, the computer program for the mathematical model can be executed in order to size the precipitator. The precipitator can be sized by generating a curve of overall mass collection efficiency versus specific collection area. This can be done by using a basic data set and shortened data sets as discussed earlier in Section 3.

Based on the curve of overall mass collection efficiency versus specific collection area and the particulate emissions standard, the precipitator size needed to attain the required efficiency can be determined. In sizing the precipitator in a conservative manner, the precipitator should be sized to attain an efficiency which is somewhat higher than that which is required. This is necessary in order to provide a margin of safety in design irrespective of any uncertainties in operating parameters and of any nonidealities which might exist. In order to provide this margin of safety, the projected collection plate area needed to attain the required efficiency should be increased by a certain percentage, possibly 10-15%. This added collection plate area is also an advantage in that it offers the possibility that the precipitator will be able to adequately treat gas flows which are somewhat higher than the design gas flow.

Step 6: Allow for the outage of electrical sections.

In designing the precipitator, a high degree of electrical sectionalization should be provided. As stated previously, this leads to improved electrical operating conditions. In addition, if certain electrical sections are not working, this condition does not disable a large portion of the precipitator.

In sizing a precipitator, proper allowance should be made for the possibility that from time to time certain electrical sections will not be functioning. This can be done by increasing the collection plate area obtained in step 4. The additional collection plate area should be provided in the form of added electrical sections. If reliable data or past experiences are not sufficient for estimating the number of electrical sections that might be inoperable at any given time, then a reasonable approach might be to add an extra electrical section for approximately every four electrical sections that are required in step 4.

The guidelines and procedure presented in this section cover the important considerations which must be made in sizing an electrostatic precipitator. If the guidelines and procedure are followed correctly, then the mathematical model of electrostatic precipitation can be a valuable tool for sizing electrostatic precipitators. Since the procedure includes reasonable conservative measures to account for several different uncertainties, the cumulative effect should lead to a precipitator which is sized conservatively but not excessively oversized.

SECTION 10

PRECAUTIONS TO TAKE IN USING THE MODEL

In using the mathematical model of electrostatic precipitation, there are several precautions that should be taken in order to ensure proper usage of the model. Some of these precautions have already been mentioned throughout the text. In this section, all the precautions which should be taken are brought together in a single location.

Precaution 1: The inlet particle size distribution which is utilized in the model should be the actual size distribution which will be seen by the precipitator. Also, in using measured particle size distributions, make sure the size distribution has been obtained based on the true density of the particles. The model must have particle size distributions based on the true diameters of the particles. Thus, particle size distributions based on aerodynamic diameters or other non-physical diameters are not appropriate for use in the model and they must be redetermined based on the true diameters.

Precaution 2: The bulk resistivity of the particles to be collected should be measured before using the model. An accurate knowledge of the resistivity is essential for estimating maximum allowable current density in a precipitator. This measurement should be made in situ or under simulated conditions in the laboratory or, preferrably, by both means. In making this measurement, all environmental conditions that will prevail in the precipitator should be duplicated in order to ensure that the measured value will be representative of that found in the precipitator. The most critical of these conditions are temperature, gas composition, moisture content, and electric field strength in the particulate layer.

Precaution 3: In specifying the electrical operating conditions to be used in the model, make sure the maximum allowable current density is not exceeded. The model does not account for the detrimental effects of excessive sparking and back corona and, if either of these conditions exists, the model will overpredict particle collection efficiencies when the voltages and currents which produce these conditions are used. Although, as discussed earlier, the model can be used in a troubleshooting procedure to determine whether or not excessive sparking or back corona is occurring in a precipitator, it is recommended that the model not

be used to simulate the operation of a precipitator in which either of these conditions exists since no method is presently available for determining the current which is effective in the precipitation process. If excessive sparking or back corona exists in a precipitator, then measures should be taken to correct this problem before the model is used. The measured value of resistivity and Figure 15 can be used to help determine the maximum allowable current density. However, for collected particulate layers with high resistivities ($>10^{12}$ ohm-cm), it may not be possible to eliminate entirely the effects of back corona. When using the model to size a precipitator, always use the measured value of resistivity, Figure 15, and any experimental data from similar situations in order to make a reasonable estimate of the maximum allowable current density. In sizing a precipitator, it must be emphasized that care must be taken in specifying the maximum allowable current density since a reasonable estimate of this quantity is necessary for predicting the optimum collection area. Significant overestimation of the maximum allowable current density must be avoided in order to prevent severe undersizing of a precipitator.

Precaution 4: When using the option for calculating voltage-current characteristics of wire-plate geometries, care must be taken in specifying a value for the roughness factor of the discharge electrodes and in interpreting the results of the calculation. In practice, the values of the roughness factor range between 0.5 and 1.0 and small changes in the value of this quantity can result in significant changes in the theoretical voltage-current curve. Decreasing the value of the roughness factor leads to higher ion densities near the discharge electrode and to higher currents for the same applied voltage. Since it is impossible to predict what condition the discharge electrodes will be in once a precipitator is constructed and since this condition will change during the operation of the precipitator, it is difficult to determine what value of the roughness factor is appropriate for sizing a new precipitator. Representative values of this quantity might be determined by fitting voltage-current characteristics for similar situations. Alternatively, calculations can be made for several values of the roughness factor in the range 0.5-1.0 in order to produce various possible combinations of operating applied voltage and current and the sizing of a precipitator can be based on a value of this quantity that produces conservative estimates of overall mass collection efficiency. It should be kept in mind that if the discharge electrodes become completely covered with material during operation, that this has the effect of increasing the size of the discharge electrode in addition to a roughness of the surface. This situation should be prevented by periodic rapping or vibration of the discharge electrodes with sufficient force to keep large buildups of material off the electrodes.

Precaution 5: The applied voltage, current density, and electric field at the plate are sensitive to the value of reduced effective ion mobility that is used in the model. If *in situ* or laboratory measurements of effective ion mobility can not be obtained, then make sure the value which is used is consistent with those values given in Table 1.

Precaution 6: Recent studies[4] have revealed peculiar electrical operating conditions in certain hot-side precipitators. One unexpected observation is very steep current-voltage curves for the electrical sets. For hot-side precipitators, the expected range (≈ 20-30 kV) from the corona starting voltage to the maximum voltage would be on the order of 10 kV or more, whereas in these cases the range (≈ 18-23 kV) for the outlet electrical fields is on the order of 5 kV or less. This type of behavior results in low operating voltages in the outlet electrical fields. Another unexpected observation is that the voltage waveforms for the electrical fields of the precipitator show the voltage decaying to a value less than the corona starting voltage. This indicates that a mechanism in addition to the applied voltage is sustaining the current. However, measured values of resistivity and electrical breakdown strength do not lend support for arguing that the layer collected at the plate was experiencing electrical breakdown. These phenomena associated with hot-side precipitators are under investigation at the present time. Whether they are due to the properties of the gas, the properties of the collected particulate layers, or a combination of both is yet to be established firmly. As a consequence of the possible limitation in applied voltage, care must be taken in choosing electrical operating conditions to be used in the model for simulating the performance of hot-side precipitators. When sizing hot-side precipitators, it is suggested that recent voltage-current data for different installations be obtained and used as a guide in choosing the electrical operating conditions.

Precaution 7: Make sure the value of gas viscosity that is used in the model is consistent with the values given in Table 2. The gas viscosity has a significant effect of particle migration velocities and should be specified as accurately as possible.

Precaution 8: In making the electrical calculations in the model, the values of NX and NY must be large enough to provide sufficient accuracy in the numerical procedures. For NVI = 1, the values of NX and NY should not be less than 11 and 9, respectively. For NVI = 2, the values of NX and NY should both be at least 15.

Precaution 9: When using the more rigorous charging theory, make sure the values of NN and NUMINC are large enough to provide sufficient accuracy in the numerical calculations. For NVI = 1, a value of NN = 10 normally provides sufficient accuracy when the precipitator is divided into incremental lengths of approximately 0.305 m or less. For NVI = 2, a value of NN = 5 normally provides sufficient accuracy since particle charging calculations are

performed over small, subincremental lengths. NUMINC must be an even number and a value of NUMINC = 20 normally provides sufficient accuracy. In order to speed up the calculations, NUMINC can be reduced to a value as low as 10 without causing too great a change in the results. The use of values of NUMINC which are less than 10 is not recommended.

Precaution 10: The procedures which are used in the model to estimate the effects of nonideal conditions yield the best results when applied to high efficiency precipitators. If nonideal conditions (especially particle reentrainment) exist to a large extent in a precipitator, then the deviation from the exponential-type relationship which is used in the model to describe particle collection can be so large as to result in an inadequate representation by the model. In this type of situation, a set of nonideal parameters that results in a good representation of nonideal conditions for one gas volume flow may be completely different at another gas volume flow. Thus, in sizing a precipitator to collect particles which are easily reentrained (due to low resistivity, low density, etc.), care must be taken in choosing an appropriate set of nonideal parameters that will be characteristic of the actual operating conditions. For this type of application, errors in sizing can be reduced by designing the precipitator such that the gas velocity through the precipitator is as low as possible.

Precaution 11: When sizing a precipitator, never base the final size on calculations from the estimation procedure. Always check the size obtained from the estimation procedure with that predicted by the more rigorous calculation and, if necessary, make the proper adjustment to the size of the precipitator.

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APPENDIX A

OUTPUT DATA FROM EXAMPLE 1

```
**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    T.E.R.L.-R.T.P. AND SO.R.T.     *
*                                    *
*       REVISION 7,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  1

DATA ON CARD NUMBER   2

LAB ESP: SCA=125FT2/1000ACFM;J=24.0UA/FT2

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  1  NX = 10  NY = 10  NITER =  3  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  2

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

DL =  0.01500 GRN/ACF  PL =  10.0000 FT  ETAO = 99.00000 %  DD =  1000.00 KG/M**3  EPS =  5.100E+00
VRATIO =   1.0300  US = 0.000165 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  1.00E+09 OHM-CM

DATA ON CARD NUMBER   6

ASNUCK( 1) = 0.00  AZIGGY( 1) = 0.00  AZNUMS( 1) =  4.0
ASNUCK( 2) = 0.10  AZIGGY( 2) = 0.10  AZNUMS( 2) =  4.0


DATA ON CARD NUMBER   7
```

ENDPT(1) = 0.200 UM ENDPT(2) = 0.300 UM ENDPT(3) = 0.400 UM ENDPT(4) = 0.500 UM ENDPT(5) = 0.600 UM
ENDPT(6) = 0.800 UM ENDPT(7) = 1.000 UM ENDPT(8) = 1.200 UM ENDPT(9) = 1.400 UM ENDPT(10) = 1.800 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 2.200 UM ENDPT(12) = 3.000 UM ENDPT(13) = 4.000 UM ENDPT(14) = 6.000 UM ENDPT(15) = 10.000 UM
ENDPT(16) = 20.000 UM

DATA ON CARD NUMBER 9

PRCU(1) = 0.0000 % PRCU(2) = 0.0002 % PRCU(3) = 0.4002 % PRCU(4) = 1.0002 % PRCU(5) = 2.6672 %
PRCU(6) = 7.6672 % PRCU(7) = 12.6002 % PRCU(8) = 17.6002 % PRCU(9) = 21.3332 % PRCU(10) = 29.3332 %

DATA ON CARD NUMBER 10

PRCU(11) = 36.0002 % PRCU(12) = 46.6672 % PRCU(13) = 57.3342 % PRCU(14) = 68.6672 % PRCU(15) = 80.6672 %
PRCU(16) = 100.0000 %

DATA ON CARD NUMBER 11

NUMSEC = 3 LSECT(1) = 3 LSECT(2) = 3 LSECT(3) = 6

DATA ON CARD NUMBER 12

AS(1) = 6.2500E+00 FT**2 VDS(1) = 4.6000E+04 V TCS(1) = 1.5000E-04 A WLS(1) = 6.2500E+00 FT
ACS(1) = 4.6875E-02 IN BS(1) = 5.0000E+00 IN NWS(1) = 5.0000E+00

DATA ON CARD NUMBER 13

SYS(1) = 2.5000E+00 IN VGS(1) = 2.0000E+02 FT**3/MIN VGASS(1) = 3.2000E+00 FT/SEC TEMPS(1) = 7.6800E+01 F
PS(1) = 1.0000E+00 ATM VISS(1) = 1.8000E-05 KG/M-SEC LINCS(1) = 8.3333E-01 FT

DATA ON CARD NUMBER 14

AS(2) = 6.2500E+00 FT**2 VDS(2) = 4.5800E+04 V TCS(2) = 1.5000E-04 A WLS(2) = 6.2500E+00 FT
ACS(2) = 4.6875E-02 IN BS(2) = 5.0000E+00 IN NWS(2) = 5.0000E+00

DATA ON CARD NUMBER 15

SYS(2) = 2.5000E+00 IN VGS(2) = 2.0000E+02 FT**3/MIN VGASS(2) = 3.2000E+00 FT/SEC TEMPS(2) = 7.6800E+01 F
PS(2) = 1.0000E+00 ATM VISS(2) = 1.8000E-05 KG/M-SEC LINCS(2) = 8.3333E-01 FT

DATA ON CARD NUMBER 16

AS(3) = 1.2500E+01 FT**2 VOS(3) = 4.4400E+04 V TCS(3) = 3.0000E-04 A WLS(3) = 1.2500E+01 FT
ACS(3) = 4.6875E-02 IN BS(3) = 5.0000E+00 IN NWS(3) = 1.0000E+01

DATA ON CARD NUMBER 17

SYS(3) = 2.5000E+00 IN VGS(3) = 2.0000E+02 FT**3/MIN VGASS(3) = 3.2000E+00 FT/SEC TEMPS(3) = 7.6800E+01 F
PS(3) = 1.0000E+00 ATM VISS(3) = 1.8000E-05 KG/M-SEC LINCS(3) = 8.3333E-01 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24.0UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0860	3.622E+05	2.7624E+05	2.2804E+13	25.8	6.69E-06	1.033E-05	3.027E-04	5.00E-08	2.58E-04	1
1.0501	3.622E+05	2.7455E+05	2.3583E+13	25.8	4.07E-06	6.545E-06	1.917E-04	6.06E-08	2.58E-04	2
1.0288	3.622E+05	2.7356E+05	2.4073E+13	25.8	2.89E-06	4.124E-06	1.208E-04	5.37E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0165	3.606E+05	2.7206E+05	2.4470E+13	25.8	2.35E-06	2.836E-06	8.310E-05	4.64E-08	2.58E-04	4
1.0096	3.606E+05	2.7206E+05	2.4638E+13	25.8	2.04E-06	2.085E-06	6.107E-05	4.03E-08	2.58E-04	5
1.0056	3.606E+05	2.7206E+05	2.4736E+13	25.8	1.80E-06	1.589E-06	4.655E-05	3.49E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0031	3.496E+05	2.6452E+05	2.5578E+13	25.8	1.60E-06	1.206E-06	3.533E-05	2.93E-08	2.58E-04	7
1.0018	3.496E+05	2.6452E+05	2.5611E+13	25.8	1.50E-06	9.603E-07	2.813E-05	2.54E-08	2.58E-04	8
1.0011	3.496E+05	2.6452E+05	2.5631E+13	25.8	1.42E-06	7.745E-07	2.269E-05	2.21E-08	2.58E-04	9

1.0006	3.496E+05	2.6452E+05	2.5642E+13	25.8	1.35E-06	6.304E-07	1.847E-05	1.92E-08	2.58E-04	10
1.0004	3.496E+05	2.6452E+05	2.5649E+13	25.8	1.27E-06	5.174E-07	1.516E-05	1.68E-08	2.58E-04	11
1.0002	3.496E+05	2.6452E+05	2.5653E+13	25.8	1.20E-06	4.272E-07	1.252E-05	1.46E-08	2.58E-04	12

EST. EFFICIENCY = 99.00 UNCORRECTED COMPUTED EFFICIENCY = 93.24

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24.0UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.11

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0543	3.622E+05	2.7479E+05	2.3490E+13	25.8	6.71E-06	1.032E-05	3.022E-04	4.98E-08	2.58E-04	1
1.0371	3.622E+05	2.7395E+05	2.3879E+13	25.8	4.07E-06	6.541E-06	1.916E-04	6.06E-08	2.58E-04	2
1.0250	3.622E+05	2.7338E+05	2.4162E+13	25.8	2.89E-06	4.130E-06	1.210E-04	5.38E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.11

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0168	3.606E+05	2.7208E+05	2.4463E+13	25.8	2.35E-06	2.842E-06	8.326E-05	4.65E-08	2.58E-04	4
1.0114	3.606E+05	2.7208E+05	2.4593E+13	25.8	2.04E-06	2.088E-06	6.117E-05	4.03E-08	2.58E-04	5
1.0078	3.606E+05	2.7208E+05	2.4682E+13	25.8	1.80E-06	1.591E-06	4.662E-05	3.49E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.11

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0052	3.496E+05	2.6461E+05	2.5527E+13	25.A	1.60E-06	1.208E-06	3.538E-05	2.93E-0A	2.58E-04	7
1.0036	3.496E+05	2.6461E+05	2.5568E+13	25.A	1.50E-06	9.615E-07	2.817E-05	2.54E-0A	2.58E-04	A
1.0025	3.496E+05	2.6461E+05	2.5596E+13	25.A	1.42E-06	7.753E-07	2.271E-05	2.21E-0A	2.58E-04	9
1.0017	3.496E+05	2.6461E+05	2.5615E+13	25.A	1.35E-06	6.310E-07	1.849E-05	1.92E-0A	2.58E-04	10
1.0012	3.496E+05	2.6461E+05	2.5629E+13	25.A	1.27E-06	5.178E-07	1.517E-05	1.68E-0A	2.58E-04	11
1.0008	3.496E+05	2.6461E+05	2.5638E+13	25.A	1.20E-06	4.275E-07	1.253E-05	1.46E-0A	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.6765	1.6491	1.6069	1.5659	1.5128	1.4572	1.4146	1.3809
3	1.8868	1.8344	1.7709	1.7129	1.6406	1.5667	1.5110	1.4676
4	2.0127	1.9433	1.8663	1.7977	1.7136	1.6287	1.5653	1.5160
5	2.1027	2.0207	1.9338	1.8577	1.7651	1.6724	1.6034	1.5501
6	2.1726	2.0805	1.9859	1.9039	1.8047	1.7060	1.6328	1.5762
7	2.2263	2.1253	2.0239	1.9369	1.8322	1.7285	1.6517	1.5926
8	2.2719	2.1634	2.0564	1.9651	1.8558	1.7478	1.6682	1.6069
9	2.3116	2.1966	2.0847	1.9897	1.8765	1.7648	1.6826	1.6195
10	2.3466	2.2259	2.1097	2.0116	1.8948	1.7800	1.6955	1.6307
11	2.3779	2.2521	2.1322	2.0312	1.9113	1.7936	1.7071	1.6409
12	2.4063	2.2759	2.1525	2.0489	1.9262	1.8059	1.7177	1.6501

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9805
2	1.3419	1.3037	1.2638	1.2246	1.1852	1.1440	1.0975
3	1.4177	1.3692	1.3189	1.2699	1.2210	1.1704	1.1185
4	1.4596	1.4052	1.3488	1.2942	1.2399	1.1839	1.1279
5	1.4892	1.4305	1.3699	1.3113	1.2533	1.1935	1.1345
6	1.5119	1.4499	1.3861	1.3245	1.2636	1.2009	1.1396
7	1.5255	1.4609	1.3946	1.3307	1.2677	1.2032	1.1396
8	1.5374	1.4706	1.4022	1.3307	1.2677	1.2032	1.1396
9	1.5479	1.4793	1.4089	1.3307	1.2677	1.2032	1.1396
10	1.5573	1.4870	1.4089	1.3307	1.2677	1.2032	1.1396
11	1.5659	1.4941	1.4089	1.3307	1.2677	1.2032	1.1396
12	1.5737	1.4941	1.4089	1.3307	1.2677	1.2032	1.1396

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.30576E-17	0.53184E-17	0.81218E-17	0.11451E-16	0.17409E-16	0.27117E-16	0.38808E-16	0.52455E-16
3	0.34412E-17	0.59159E-17	0.89506E-17	0.12526E-16	0.18879E-16	0.29155E-16	0.41455E-16	0.55747E-16
4	0.36708E-17	0.62673E-17	0.94325E-17	0.13147E-16	0.19720E-16	0.30309E-16	0.42942E-16	0.57586E-16
5	0.38350E-17	0.65169E-17	0.97737E-17	0.13585E-16	0.20312E-16	0.31122E-16	0.43990E-16	0.58880E-16
6	0.39624E-17	0.67099E-17	0.10037E-16	0.13923E-16	0.20768E-16	0.31747E-16	0.44795E-16	0.59875E-16
7	0.40603E-17	0.68543E-17	0.10229E-16	0.14164E-16	0.21085E-16	0.32165E-16	0.45315E-16	0.60498E-16
8	0.41436E-17	0.69772E-17	0.10393E-16	0.14370E-16	0.21356E-16	0.32526E-16	0.45766E-16	0.61039E-16
9	0.42159E-17	0.70841E-17	0.10536E-16	0.14551E-16	0.21594E-16	0.32842E-16	0.46162E-16	0.61517E-16
10	0.42797E-17	0.71786E-17	0.10663E-16	0.14710E-16	0.21805E-16	0.33123E-16	0.46516E-16	0.61944E-16
11	0.43369E-17	0.72633E-17	0.10776E-16	0.14853E-16	0.21994E-16	0.33376E-16	0.46835E-16	0.62330E-16
12	0.43886E-17	0.73399E-17	0.10879E-16	0.14983E-16	0.22166E-16	0.33607E-16	0.47125E-16	0.62682E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.47743E-14
2	0.76553E-16	0.11538E-15	0.18783E-15	0.32811E-15	0.64529E-15	0.15888E-14	0.53438E-14
3	0.80874E-16	0.12118E-15	0.19602E-15	0.34026E-15	0.66482E-15	0.16255E-14	0.54458E-14
4	0.83269E-16	0.12436E-15	0.20047E-15	0.34677E-15	0.67509E-15	0.16442E-14	0.54918E-14
5	0.84954E-16	0.12660E-15	0.20361E-15	0.35136E-15	0.68237E-15	0.16575E-14	0.55241E-14
6	0.86249E-16	0.12832E-15	0.20602E-15	0.35490E-15	0.68798E-15	0.16678E-14	0.55489E-14
7	0.87025E-16	0.12930E-15	0.20728E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14
8	0.87702E-16	0.13016E-15	0.20841E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14
9	0.88302E-16	0.13092E-15	0.20941E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14
10	0.88841E-16	0.13161E-15	0.20941E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14
11	0.89329E-16	0.13223E-15	0.20941E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14
12	0.89775E-16	0.13223E-15	0.20941E-15	0.35657E-15	0.69025E-15	0.16710E-14	0.55489E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0010	0.0006	88.5687	8.824	11.4313	88.5687	8.824	11.4313
3.500E-07	1.414	0.400	1.8884	1.1360	88.7009	8.872	11.2991	88.2556	8.715	11.7444
4.500E-07	1.320	0.600	2.6661	1.6182	89.3651	9.118	10.6349	88.8470	8.925	11.1530
5.500E-07	1.261	1.667	6.7526	4.0195	90.3050	9.495	9.6950	90.0288	9.381	9.9712
7.000E-07	1.205	5.000	17.7324	10.5981	91.5119	10.036	8.4881	91.2347	9.905	8.7653
9.000E-07	1.159	4.933	14.3956	8.8090	93.0155	10.829	6.9845	92.6155	10.602	7.3845
1.100E-06	1.130	5.000	12.1546	7.6348	94.1818	11.572	5.8182	93.6856	11.239	6.3144
1.300E-06	1.110	3.733	7.5813	5.0878	95.1393	12.304	4.8607	94.3638	11.702	5.6362
1.600E-06	1.090	8.000	12.8201	9.0344	96.1645	13.268	3.8355	95.3300	12.467	4.6700
2.000E-06	1.072	6.667	7.9521	6.3865	97.1453	14.469	2.8547	96.0386	13.137	3.9614
2.600E-06	1.055	10.667	8.5246	8.6386	98.0873	16.099	1.9127	96.6510	13.820	3.3490
3.500E-06	1.041	10.667	5.1979	7.4069	98.8337	18.112	1.1663	97.1285	14.446	2.8715
5.000E-06	1.029	11.333	2.1822	8.4664	99.5391	21.890	0.4609	96.9107	14.148	3.0893
8.000E-06	1.018	12.000	0.1505	8.9957	99.9700	33.002	0.0300	96.9000	14.134	3.1000
1.500E-05	1.010	19.333	0.0008	12.1675	99.9999	58.252	0.0001	97.3973	14.846	2.6027

EFFICIENCY = STATED = 93.24 COMPUTED = 93.2425 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 97.6066
MMD OF INLET SIZE DISTRIBUTION = 3.300E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.934
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.279E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.626E+00
LOG-NORMAL GOODNESS OF FIT = 0.961
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 15.187

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 95.8647
CORRECTED MMD OF EFFLUENT = 2.407E+00
CORRECTED SIGMAP OF EFFLUENT = 2.177E+00
LOG-NORMAL GOODNESS OF FIT = 0.913
CORRECTED PRECIPITATION RATE PARAMETER = 12.96

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.795E+00	6.066E+01	4.872E-05	1.619E-03	1.668E-03	4.360E-02	2.500E-07
4.088E+00	6.339E+01	1.357E-01	5.350E-03	1.411E-01	1.022E-01	3.500E-07
4.448E+00	6.649E+01	2.471E-01	1.204E-02	2.591E-01	1.784E-01	4.500E-07
4.832E+00	6.950E+01	7.659E-01	2.182E-02	7.878E-01	2.642E-01	5.500E-07
5.425E+00	7.364E+01	1.275E+00	4.163E-02	1.316E+00	7.953E-01	7.000E-07
6.224E+00	7.834E+01	1.334E+00	7.442E-02	1.411E+00	1.132E+00	9.000E-07
7.022E+00	8.220E+01	1.379E+00	1.176E-01	1.496E+00	1.424E+00	1.100E-06
7.817E+00	8.536E+01	1.017E+00	1.623E-01	1.179E+00	1.661E+00	1.300E-06
9.001E+00	8.905E+01	1.055E+00	2.295E-01	1.285E+00	3.831E+00	1.600E-06
1.056E+01	9.254E+01	8.195E-01	3.177E-01	1.137E+00	4.234E+00	2.000E-06
1.286E+01	9.576E+01	5.684E-01	4.268E-01	9.952E-01	8.791E+00	2.600E-06
1.624E+01	9.815E+01	3.737E-01	5.463E-01	9.200E-01	1.044E+01	3.500E-06
2.189E+01	9.954E+01	1.113E-01	6.348E-01	7.461E-01	1.709E+01	5.000E-06
3.300E+01	9.997E+01	6.094E-03	6.231E-01	6.292E-01	2.114E+01	8.000E-06
5.825E+01	1.000E+02	2.390E-05	6.272E-01	6.272E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 95.8647 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.300E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.407E+00 UM OUTLET SIGMAP = 2.177E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0006	0.0005	85.0413	7.730	14.9587	85.0413	7.730	14.9587
3.500E-07	1.414	0.400	1.5105	1.0237	85.1390	7.757	14.8610	84.6075	7.614	15.3925
4.500E-07	1.320	0.600	2.1586	1.4741	85.8414	7.954	14.1586	85.2230	7.780	14.7770
5.500E-07	1.261	1.667	5.5601	3.7294	86.8737	8.262	13.1263	86.5441	8.161	13.4559
7.000E-07	1.205	5.000	14.9759	10.0738	88.2127	8.700	11.7873	87.8819	8.587	12.1181
9.000E-07	1.159	4.933	12.6233	8.6511	89.9295	9.340	10.0705	89.4519	9.152	10.5481
1.100E-06	1.130	5.000	11.0645	7.7320	91.2913	9.931	8.7087	90.6989	9.664	9.3011
1.300E-06	1.110	3.733	7.1718	5.2670	92.4393	10.507	7.5607	91.5136	10.037	8.4864
1.600E-06	1.090	8.000	12.8182	9.7120	93.6944	11.245	6.3056	92.6982	10.648	7.3018
2.000E-06	1.072	6.667	8.5701	7.0716	94.9412	12.142	5.0588	93.6203	11.198	6.3797
2.600E-06	1.055	10.667	10.2993	9.7794	96.2002	13.306	3.7998	94.4858	11.791	5.5142
3.500E-06	1.041	10.667	7.4536	8.4866	97.2501	14.622	2.7499	95.2147	12.368	4.7853
5.000E-06	1.029	11.333	4.4961	8.8535	98.4387	16.925	1.5613	95.3013	12.442	4.6987
8.000E-06	1.018	12.000	1.0551	8.0015	99.6540	23.056	0.3460	95.9895	13.086	4.0105
1.500E-05	1.010	19.333	0.2420	10.1438	99.9507	30.987	0.0493	96.8441	14.061	3.1559

EFFICIENCY = STATED = 93.24 COMPUTED = 93.2425 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 96.0646
MMD OF INLET SIZE DISTRIBUTION = 3.300E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.934
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.475E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.720E+00
LOG-NORMAL GOODNESS OF FIT = 0.960
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.163

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 93.9853
CORRECTED MMD OF EFFLUENT = 2.354E+00
CORRECTED SIGMAP OF EFFLUENT = 2.116E+00
LOG-NORMAL GOODNESS OF FIT = 0.923
CORRECTED PRECIPITATION RATE PARAMETER = 11.44

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.795E+00	6.066E+01	6.375E-05	1.933E-03	1.996E-03	4.360E-02	2.500E-07
4.088E+00	6.339E+01	1.785E-01	6.386E-03	1.849E-01	1.022E-01	3.500E-07
4.448E+00	6.649E+01	3.290E-01	1.437E-02	3.433E-01	1.784E-01	4.500E-07
4.832E+00	6.950E+01	1.037E+00	2.604E-02	1.063E+00	2.642E-01	5.500E-07
5.425E+00	7.364E+01	1.770E+00	4.969E-02	1.820E+00	7.953E-01	7.000E-07
6.224E+00	7.834E+01	1.924E+00	9.122E-02	2.015E+00	1.132E+00	9.000E-07
7.022E+00	8.220E+01	2.064E+00	1.404E-01	2.204E+00	1.424E+00	1.100E-06
7.817E+00	8.536E+01	1.582E+00	1.937E-01	1.776E+00	1.661E+00	1.300E-06
9.001E+00	8.905E+01	1.734E+00	2.740E-01	2.008E+00	3.831E+00	1.600E-06
1.056E+01	9.254E+01	1.452E+00	3.792E-01	1.831E+00	4.234E+00	2.000E-06
1.286E+01	9.576E+01	1.129E+00	5.095E-01	1.639E+00	8.791E+00	2.600E-06
1.624E+01	9.815E+01	8.810E-01	6.521E-01	1.533E+00	1.044E+01	3.500E-06
2.189E+01	9.954E+01	3.771E-01	7.577E-01	1.135E+00	1.709E+01	5.000E-06
3.300E+01	9.997E+01	7.024E-02	7.438E-01	8.140E-01	2.114E+01	8.000E-06
5.825E+01	1.000E+02	1.187E-02	7.487E-01	7.605E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 93.9853 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.300E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.354E+00 UM OUTLET SIGMAP = 2.116E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX B

OUTPUT DATA FROM EXAMPLE 2

```
**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    T.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*        REVISION I,JAN. 1, 1978     *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  1

DATA ON CARD NUMBER   2

LAB ESP; SCA=82FT2/1000ACFM;CALCULATED V-I FOR EACH ELECTRICAL SECTION

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  2  NX = 15  NY = 15  NITER =  1  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  2

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

IFINAL = 20  JI1 =  2  JI2 = 21  VISKIP = 1  VISAME =  2

DATA ON CARD NUMBER   6

DL =  0.06500 GRN/ACF  PL =  10.0000 FT  FTAD = 99.00000 %  DD =  1000.00 KG/M**3  EPS =  5.100E+00
VRATIO =  1.0300  US = 0.000165 M**2/V-SEC  FPATH =  1.0000  ERD = 1500000. V/M  RHOCGS =  1.00E+09 OHM-CM

DATA ON CARD NUMBER   7

ASNUCK( 1) = 0.00  AZIGGV( 1) = 0.00  AZNUMS( 1) =  4.0
```

ABNUCK(2) = 0.10 AZIGGY(2) = 0.10 AZNUMB(2) = 4.0

DATA ON CARD NUMBER 8

ENDPT(1) = 0.200 UM ENDPT(2) = 0.300 UM ENDPT(3) = 0.400 UM ENDPT(4) = 0.500 UM ENDPT(5) = 0.600 UM
ENDPT(6) = 0.800 UM ENDPT(7) = 1.000 UM ENDPT(8) = 1.200 UM ENDPT(9) = 1.400 UM ENDPT(10) = 1.800 UM

DATA ON CARD NUMBER 9

ENDPT(11) = 2.200 UM ENDPT(12) = 3.000 UM ENDPT(13) = 4.000 UM ENDPT(14) = 6.000 UM ENDPT(15) = 10.000 UM
ENDPT(16) = 20.000 UM

DATA ON CARD NUMBER 10

PRCU(1) = 0.0000 % PRCU(2) = 0.0076 % PRCU(3) = 0.0563 % PRCU(4) = 0.2682 % PRCU(5) = 0.8652 %
PRCU(6) = 2.9845 % PRCU(7) = 5.9695 % PRCU(8) = 9.5515 % PRCU(9) = 12.8350 % PRCU(10) = 19.7004 %

DATA ON CARD NUMBER 11

PRCU(11) = 26.8643 % PRCU(12) = 38.8042 % PRCU(13) = 49.2516 % PRCU(14) = 64.1765 % PRCU(15) = 79.1014 %
PRCU(16) = 100.0000 %

DATA ON CARD NUMBER 12

NUMSEC = 3 LSECT(1) = 6 LSECT(2) = 6 LSECT(3) = 12

DATA ON CARD NUMBER 13

AS(1) = 6.2500E+00 FT**2 VDS(1) = 4.0800E+04 V TCS(1) = 6.2500E-05 A WLS(1) = 6.2500E+00 FT
ACS(1) = 4.6875E-02 IN BS(1) = 5.0000E+00 IN NWS(1) = 5.0000E+00

DATA ON CARD NUMBER 14

SYS(1) = 2.5000E+00 IN VGS(1) = 3.0533E+02 FT**3/MIN VGASS(1) = 4.8853E+00 FT/SEC TEMPS(1) = 7.6000E+01 F
PS(1) = 1.0000E+00 ATM VISS(1) = 1.8000E-05 KG/M-SEC LINCS(1) = 4.1667E-01 FT

DATA ON CARD NUMBER 15

RFS(1) = 9.0000E-01 START1(1) = 6.0000E-05 A/M**2 START2(1) = 2.0000E-05 A/M**2
START3(1) = 2.0000E-05 A/M**2 VSTAR(1) = 3.8000E+04 V

DATA ON CARD NUMBER 16

AS(2) = 6.2500E+00 FT**2 VOS(2) = 4.0800E+04 V TCS(2) = 6.2500E-05 A WLS(2) = 6.2500E+00 FT
ACS(2) = 4.6875E-02 IN BS(2) = 5.0000E+00 IN NWS(2) = 5.0000E+00

DATA ON CARD NUMBER 17

SYS(2) = 2.5000E+00 IN VGS(2) = 3.0533E+02 FT**3/MIN VGASS(2) = 4.8853E+00 FT/SEC TEMPS(2) = 7.6000E+01 F
PS(2) = 1.0000E+00 ATM VISS(2) = 1.8000E-05 KG/M-SEC LINCS(2) = 4.1667E-01 FT

DATA ON CARD NUMBER 18

RFS(2) = 9.0000E-01 START1(2) = 6.0000E-05 A/M**2 START2(2) = 2.0000E-05 A/M**2
START3(2) = 2.0000E-05 A/M**2 VSTAR(2) = 3.8000E+04 V

DATA ON CARD NUMBER 19

AS(3) = 1.2500E+01 FT**2 VOS(3) = 3.9600E+04 V TCS(3) = 1.2500E-04 A WLS(3) = 1.2500E+01 FT
ACS(3) = 4.6875E-02 IN BS(3) = 5.0000E+00 IN NWS(3) = 1.0000E+01

DATA ON CARD NUMBER 20

SYS(3) = 2.5000E+00 IN VGS(3) = 3.0533E+02 FT**3/MIN VGASS(3) = 4.8853E+00 FT/SEC TEMPS(3) = 7.6000E+01 F
PS(3) = 1.0000E+00 ATM VISS(3) = 1.8000E-05 KG/M-SEC LINCS(3) = 4.1667E-01 FT

DATA ON CARD NUMBER 21

RFS(3) = 9.0000E-01 START1(3) = 6.0000E-05 A/M**2 START2(3) = 2.0000E-05 A/M**2
START3(3) = 2.0000E-05 A/M**2 VSTAR(3) = 3.8000E+04 V

CLEAN GAS VOLTAGE-CURRENT DENSITY-FIELD AT THE PLATE RELATIONSHIP FOR SECTION NO. 1

VW = -3.8000E+04 ACDNTY = 6.0276E-05 AEPLT = -1.7902E+05

VW = -3.8206E+04 ACDNTY = 7.9337E-05 AEPLT = -1.8597E+05

VW = -3.8896E+04 ACDNTY = 9.9193E-05 AEPLT = -1.9435E+05

VW = -3.9513E+04 ACDNTY = 1.1904E-04 AEPLT = -2.0232E+05

VW = -4.0098E+04 ACDNTY = 1.3890E-04 AEPLT = -2.0993E+05

VW = -4.0656E+04 ACDNTY = 1.5874E-04 AEPLT = -2.1722E+05

VW = -4.1193E+04 ACDNTY = 1.7859E-04 AEPLT = -2.2424E+05

VW = -4.0711E+04 ACDNTY = 1.6251E-04 AEPLT = -2.1842E+05

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=82FT2/1000ACFM;CALCULATED V-I FOR EACH ELECTRICAL SECTION

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2	APPLIED VOLTAGE = 4.080E+04 VOLTS	TOTAL CURRENT = 9.446E-05 AMPS
WIRE TO PLATE = 1.270E-01 M	CORONA WIRE RADIUS = 1.191E-03 M	CORONA WIRE LENGTH = 1.906E+00 M
CURRENT/M = 4.955E-05 AMP/M	CURRENT DENSITY = 1.625E-04 AMP/M2	DEPOSIT E FIELD = 1.625E+03 VOLT/M
1/2 WIRE TO WIRE = 6.350E-02 M	GAS FLOW RATE = 1.444E-01 M3/SEC	GAS VELOCITY = 1.890E+00 M/SEC
TEMPERATURE = 297.222 K	PRESSURE = 1.000 ATM	VISCOSITY = 1.806E-05 KG/M-SEC
ION MOBILITY = 1.795E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 4.436E+02 M/SEC	PART. PATH PARAM.. = 5.700E-08 M
DUST WEIGHT = 2.150E-05 KG/SEC	LENGTH INCR. =0.12708435 M	INPUT EFF./INCR. = 17.46

RIOVR	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0.8267	2.085E+05	2.1842E+05	2.1564E+13	13.4	7.30E-06	6.22AE-06	5.570E-04	3.88E-08	1.62E-04	1
0.7338	2.085E+05	2.1842E+05	2.1580E+13	11.9	4.34E-06	9.904F-06	8.859E-04	9.22F-08	1.62E-04	2
0.7114	2.085E+05	2.1842E+05	2.1582E+13	11.6	2.92E-06	1.026E-05	9.180E-04	1.16E-07	1.62E-04	3
0.7040	2.085E+05	2.1842E+05	2.1582E+13	11.4	2.26E-06	9.832F-06	8.794E-04	1.28F-07	1.62F-04	4
0.7027	2.085E+05	2.1842E+05	2.1583E+13	11.4	1.90E-06	9.138E-06	8.174F-04	1.33E-07	1.62E-04	5
0.7047	2.085E+05	2.1842E+05	2.1583E+13	11.5	1.62E-06	8.361E-06	7.479F-04	1.34E-07	1.62E-04	6

CLEAN GAS VOLTAGE-CURRENT DENSITY-FIELD AT THE PLATE RELATIONSHIP FOR SECTION NO. 2

VW = -3.8000E+04 ACDNTY = 6.0276E-05 AEPLT = -1.7902E+05

VW = -3.8206E+04 ACDNTY = 7.9337E-05 AEPLT = -1.8597E+05

VW = -3.8896E+04 ACDNTY = 9.9193E-05 AEPLT = -1.9435E+05

VW = -3.9513E+04 ACDNTY = 1.1904E-04 AEPLT = -2.0232E+05

VW = -4.0098E+04 ACDNTY = 1.3890E-04 AEPLT = -2.0993E+05

VW = -4.0656E+04 ACDNTY = 1.5874E-04 AEPLT = -2.1722E+05

VW = -4.1193E+04 ACDNTY = 1.7859E-04 AEPLT = -2.2424E+05

VW = -4.0711E+04 ACDNTY = 1.6251E-04 AEPLT = -2.1842E+05

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 4.955E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.222 K
ION MOBILITY = 1.795E-04 M2/VOLT-SEC
DUST WEIGHT = 2.150E-05 KG/SEC

APPLIED VOLTAGE = 4.080E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.625E-04 AMP/M2
GAS FLOW RATE = 1.444E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.436E+02 M/SEC
LENGTH INCR. =0.12708435 M

TOTAL CURRENT = 9.446E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 1.625E+03 VOLT/M
GAS VELOCITY = 1.490E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.700E-08 M
INPUT EFF./INCR. = 17.46

RIOVR	ERAVG	EPLT	AFID	CHCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0.7085	2.085E+05	2.1842E+05	2.1583E+13	11.5	1.44E-06	7.585E-06	6.784E-04	1.32E-07	1.62E-04	7
0.7134	2.085E+05	2.1842E+05	2.1583E+13	11.6	1.32E-06	6.849E-06	6.126E-04	1.29E-07	1.62E-04	8
0.7190	2.085E+05	2.1842E+05	2.1583E+13	11.7	1.18E-06	6.170E-06	5.519E-04	1.25E-07	1.62E-04	9
0.7250	2.085E+05	2.1842E+05	2.1583E+13	11.8	1.07E-06	5.556E-06	4.970E-04	1.21E-07	1.62E-04	10
0.7313	2.085E+05	2.1842E+05	2.1583E+13	11.9	9.69E-07	5.006E-06	4.478E-04	1.16E-07	1.62E-04	11
0.7377	2.085E+05	2.1842E+05	2.1583E+13	12.0	9.25E-07	4.517E-06	4.040E-04	1.12E-07	1.62E-04	12

CLEAN GAS VOLTAGE-CURRENT DENSITY-FIELD AT THE PLATE RELATIONSHIP FOR SECTION NO. 3

VW = -3.8000E+04 ACDNTY = 6.0277E-05 AEPLT = -1.7902E+05

VW = -3.8205E+04 ACDNTY = 7.9332E-05 AEPLT = -1.8596E+05

VW = -3.8896E+04 ACDNTY = 9.9192E-05 AEPLT = -1.9435E+05

VW = -3.9512E+04 ACONTY = 1.1904E-04 AEPLT = -2.0232E+05

VW = -4.0098E+04 ACONTY = 1.3889E-04 AEPLT = -2.0993E+05

VW = -3.9514E+04 ACONTY = 1.2081E-04 AEPLT = -2.0279E+05

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.684E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.222 K
ION MOBILITY = 1.795E-04 M2/VOLT-SEC
DUST WEIGHT = 2.150E-05 KG/SEC

APPLIED VOLTAGE = 3.960E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.208E-04 AMP/M2
GAS FLOW RATE = 1.444E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.436E+02 M/SEC
LENGTH INCR. =0.12708435 M

TOTAL CURRENT = 1.404E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 1.208E+03 VOLT/M
GAS VELOCITY = 1.490E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.700E-08 M
INPUT EFF./INCR. = 17.46

RIOVR	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0.6947	2.001E+05	2.0279E+05	1.7774E+13	8.4	8.44E-07	3.800E-06	3.399E-04	9.93E-08	1.21E-04	13
0.7020	2.001E+05	2.0279E+05	1.7774E+13	8.5	7.96E-07	3.456E-06	3.091E-04	9.48E-08	1.21E-04	14
0.7094	2.001E+05	2.0279E+05	1.7774E+13	8.6	7.57E-07	3.150E-06	2.818E-04	9.04E-08	1.21E-04	15
0.7167	2.001E+05	2.0279E+05	1.7774E+13	8.7	7.25E-07	2.881E-06	2.577E-04	8.62E-08	1.21E-04	16
0.7240	2.001E+05	2.0279E+05	1.7774E+13	8.8	6.99E-07	2.644E-06	2.365E-04	8.22E-08	1.21E-04	17
0.7312	2.001E+05	2.0279E+05	1.7774E+13	8.8	6.73E-07	2.433E-06	2.176E-04	7.85E-08	1.21E-04	18
0.7382	2.001E+05	2.0279E+05	1.7774E+13	8.9	6.52E-07	2.246E-06	2.009E-04	7.49E-08	1.21E-04	19
0.7451	2.001E+05	2.0279E+05	1.7774E+13	9.0	6.34E-07	2.079E-06	1.859E-04	7.15E-08	1.21E-04	20
0.7520	2.001E+05	2.0279E+05	1.7774E+13	9.1	6.18E-07	1.929E-06	1.725E-04	6.84E-08	1.21E-04	21
0.7587	2.001E+05	2.0279E+05	1.7774E+13	9.2	6.05E-07	1.794E-06	1.605E-04	6.53E-08	1.21E-04	22
0.7652	2.001E+05	2.0279E+05	1.7774E+13	9.2	5.94E-07	1.672E-06	1.496E-04	6.25E-08	1.21E-04	23
0.7716	2.001E+05	2.0279E+05	1.7774E+13	9.3	5.84E-07	1.562E-06	1.397E-04	5.98E-08	1.21E-04	24

DESIGN EFFICIENCY = 99.00 UNCORRECTED COMPUTED EFFICIENCY = 79.98

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0603	1.0325	0.9918	0.9523	0.9013	0.8506	0.8118	0.7815
2	1.3302	1.2853	1.2346	1.1900	1.1363	1.0790	1.0324	0.9955
3	1.4762	1.4174	1.3567	1.3049	1.2438	1.1825	1.1364	1.1015
4	1.5763	1.5066	1.4380	1.3803	1.3130	1.2472	1.1991	1.1633
5	1.6522	1.5738	1.4987	1.4362	1.3638	1.2940	1.2436	1.2064
6	1.7134	1.6276	1.5470	1.4805	1.4038	1.3304	1.2779	1.2392
7	1.7645	1.6723	1.5871	1.5172	1.4368	1.3602	1.3057	1.2656
8	1.8083	1.7107	1.6214	1.5484	1.4647	1.3853	1.3290	1.2876
9	1.8467	1.7441	1.6512	1.5755	1.4889	1.4070	1.3491	1.3064
10	1.8809	1.7738	1.6776	1.5995	1.5103	1.4261	1.3666	1.3229
11	1.9116	1.8005	1.7013	1.6210	1.5294	1.4431	1.3822	1.3374
12	1.9395	1.8248	1.7228	1.6405	1.5467	1.4584	1.3963	1.3505
13	1.9579	1.8403	1.7364	1.6526	1.5571	1.4675	1.4043	1.3578
14	1.9752	1.8550	1.7492	1.6639	1.5670	1.4760	1.4120	1.3647
15	1.9916	1.8689	1.7612	1.6747	1.5763	1.4841	1.4192	1.3713
16	2.0072	1.8821	1.7727	1.6849	1.5852	1.4918	1.4260	1.3713
17	2.0219	1.8946	1.7836	1.6946	1.5937	1.4990	1.4260	1.3713
18	2.0360	1.9066	1.7940	1.7039	1.6017	1.4990	1.4260	1.3713
19	2.0495	1.9180	1.8040	1.7128	1.6094	1.4990	1.4260	1.3713
20	2.0624	1.9289	1.8135	1.7213	1.6094	1.4990	1.4260	1.3713
21	2.0747	1.9394	1.8226	1.7213	1.6094	1.4990	1.4260	1.3713
22	2.0866	1.9495	1.8314	1.7213	1.6094	1.4990	1.4260	1.3713
23	2.0980	1.9592	1.8314	1.7213	1.6094	1.4990	1.4260	1.3713
24	2.1089	1.9592	1.8314	1.7213	1.6094	1.4990	1.4260	1.3713

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.7479	0.7141	0.6800	0.6459	0.6124	0.5762	0.5399
2	0.9532	0.9108	0.8690	0.8260	0.7808	0.7332	0.6825
3	1.0611	1.0142	0.9651	0.9159	0.8656	0.8132	0.7558
4	1.1232	1.0811	1.0352	0.9818	0.9242	0.8678	0.8062
5	1.1653	1.1241	1.0814	1.0335	0.9730	0.9088	0.8449
6	1.1967	1.1553	1.1133	1.0694	1.0141	0.9440	0.8749
7	1.2217	1.1795	1.1373	1.0949	1.0461	0.9766	0.8999
8	1.2423	1.1992	1.1564	1.1143	1.0686	1.0048	0.9224
9	1.2598	1.2158	1.1721	1.1298	1.0855	1.0280	0.9434
10	1.2750	1.2300	1.1855	1.1427	1.0988	1.0461	0.9633
11	1.2885	1.2425	1.1971	1.1537	1.1098	1.0596	0.9822
12	1.3004	1.2536	1.2073	1.1632	1.1191	1.0702	0.9983
13	1.3070	1.2594	1.2123	1.1676	1.1230	1.0740	1.0064
14	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0130
15	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0185
16	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
17	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
18	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
19	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
20	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
21	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233

22	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
23	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233
24	1.3132	1.2594	1.2123	1.1676	1.1230	1.0740	1.0233

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.1A113E-17	0.31194E-17	0.46963E-17	0.65249E-17	0.97189E-17	0.14833E-16	0.20870E-16	0.27819E-16
2	0.22722E-17	0.38832E-17	0.58463E-17	0.81534E-17	0.12252E-16	0.18815E-16	0.26541E-16	0.35435E-16
3	0.25218E-17	0.42824E-17	0.64245E-17	0.89407E-17	0.13411E-16	0.20620E-16	0.29214E-16	0.39209E-16
4	0.26927E-17	0.45519E-17	0.68092E-17	0.94575E-17	0.1415AE-16	0.21749E-16	0.30828E-16	0.41410E-16
5	0.28224E-17	0.47548E-17	0.70966E-17	0.98407E-17	0.14706E-16	0.22564E-16	0.31972E-16	0.42944E-16
6	0.29268E-17	0.49173E-17	0.73255E-17	0.10144E-16	0.15137E-16	0.23199E-16	0.32853E-16	0.44111E-16
7	0.30141E-17	0.50525E-17	0.75154E-17	0.10395E-16	0.15492E-16	0.23718E-16	0.3356AE-16	0.45051E-16
A	0.30891E-17	0.51683E-17	0.76776E-17	0.10609E-16	0.15793E-16	0.24156E-16	0.34167E-16	0.45833E-16
9	0.31547E-17	0.52695E-17	0.78189E-17	0.10795E-16	0.16055E-16	0.24535E-16	0.34683E-16	0.46504E-16
10	0.32130E-17	0.53593E-17	0.79440E-17	0.10960E-16	0.16285E-16	0.24867E-16	0.35134E-16	0.47088E-16
11	0.32655E-17	0.54399E-17	0.80563E-17	0.11107E-16	0.16491E-16	0.25164E-16	0.35535E-16	0.47606E-16
12	0.33132E-17	0.55131E-17	0.81581E-17	0.11240E-16	0.16678E-16	0.25431E-16	0.35896E-16	0.48071E-16
13	0.33566E-17	0.55801E-17	0.82222E-17	0.11323E-16	0.16790E-16	0.25589E-16	0.36103E-16	0.48333E-16
14	0.33742E-17	0.56045E-17	0.82827E-17	0.11401E-16	0.16897E-16	0.25738E-16	0.36299E-16	0.48579E-16
15	0.34022E-17	0.56465E-17	0.83399E-17	0.11475E-16	0.16997E-16	0.25879E-16	0.36484E-16	0.48813E-16
16	0.342AAE-17	0.56863E-17	0.83943E-17	0.11545E-16	0.17093E-16	0.26012E-16	0.36660E-16	0.48813E-16
17	0.34540E-17	0.57242E-17	0.84460E-17	0.11611E-16	0.17184E-16	0.26140E-16	0.36660E-16	0.48813E-16
18	0.34781E-17	0.57603E-17	0.84952E-17	0.11675E-16	0.17271E-16	0.26140E-16	0.36660E-16	0.48813E-16
19	0.35010E-17	0.57948E-17	0.85423E-17	0.11736E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16
20	0.35230E-17	0.58278E-17	0.85874E-17	0.11794E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16
21	0.35441E-17	0.58594E-17	0.86306E-17	0.11794E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16
22	0.35644E-17	0.58899E-17	0.86722E-17	0.11794E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16
23	0.35838E-17	0.59191E-17	0.86722E-17	0.11794E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16
24	0.36026E-17	0.59191E-17	0.86722E-17	0.11794E-16	0.17354E-16	0.26140E-16	0.36660E-16	0.48813E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.399A0E-16	0.59228E-16	0.84712E-16	0.1621AE-15	0.31245E-15	0.74992E-15	0.24636E-14
2	0.50958E-16	0.75536E-16	0.12104E-15	0.20741E-15	0.39842E-15	0.95430E-15	0.31143E-14
3	0.56727E-16	0.84119E-16	0.13443E-15	0.2299BE-15	0.44164E-15	0.10580E-14	0.34489E-14
4	0.60047E-16	0.89667E-16	0.1441AE-15	0.24654E-15	0.4715AE-15	0.11295E-14	0.36789E-14
5	0.62294E-16	0.93232E-16	0.15063E-15	0.25950E-15	0.49646E-15	0.11A2AE-14	0.38553E-14
6	0.63975E-16	0.95816E-16	0.15507E-15	0.26854E-15	0.51746E-15	0.12286E-14	0.39920E-14
7	0.65310E-16	0.97826E-16	0.15841E-15	0.27492E-15	0.53379E-15	0.12710E-14	0.41064E-14
A	0.66413E-16	0.99461E-16	0.16107E-15	0.27979E-15	0.54524E-15	0.13078E-14	0.42091E-14
9	0.67350E-16	0.10084E-15	0.16326E-15	0.28369E-15	0.55385E-15	0.13379E-14	0.4304AE-14
10	0.68163E-16	0.10202E-15	0.16512E-15	0.28693E-15	0.56067E-15	0.13615E-14	0.43958E-14
11	0.68880E-16	0.10305E-15	0.16673E-15	0.2896AE-15	0.56629E-15	0.13790E-14	0.44819E-14
12	0.69521E-16	0.10397E-15	0.16815E-15	0.2920AE-15	0.57103E-15	0.13929E-14	0.45554E-14
13	0.69A71E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.45922E-14
14	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46223E-14
15	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46475E-14
16	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
17	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
18	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
19	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
20	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
21	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
22	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
23	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14
24	0.70201E-16	0.10445E-15	0.16886E-15	0.29319E-15	0.57303E-15	0.1397AE-14	0.46692E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	COF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2,500E-07	1,589	0,008	0,0210	0,0244	59,8767	5,673	40,1233	45,0424	3,718	54,9576
3,500E-07	1,414	0,049	0,1359	0,1308	59,4811	5,612	40,5189	54,0537	4,831	45,9463
4,500E-07	1,320	0,212	0,5826	0,5215	60,0682	5,702	39,931R	57,8917	5,373	42,1083
5,500E-07	1,261	0,597	1,5937	1,3928	61,2279	5,885	38,7721	60,0837	5,705	39,9163
7,000E-07	1,205	2,119	5,4026	4,7063	62,9750	6,172	37,0250	62,0046	6,011	37,9954
9,000E-07	1,159	2,985	7,0896	6,1893	65,5043	6,611	34,4957	64,5233	6,437	35,4767
1,100E-06	1,130	3,582	7,9404	6,9556	67,8036	7,040	32,1964	66,7758	6,845	33,2242
1,300E-06	1,110	3,283	6,7915	6,0162	69,9588	7,470	30,0412	68,6506	7,205	31,3494
1,600E-06	1,090	6,865	12,9352	11,5594	72,6349	8,050	27,3651	71,1920	7,731	28,8080
2,000E-06	1,072	7,164	12,0059	10,8313	75,6592	8,777	24,3408	74,1311	8,399	25,8689
2,600E-06	1,055	11,940	16,9421	15,7103	79,3911	9,811	20,6089	77,4871	9,262	22,5129
3,500E-06	1,041	10,447	12,0625	11,8169	83,2307	11,092	16,7693	80,6474	10,202	19,3526
5,000E-06	1,029	14,925	11,9052	12,6892	88,4146	13,389	11,5854	85,4531	11,975	14,5469
8,000E-06	1,018	14,925	4,0696	6,6496	96,0395	20,056	3,9605	92,3770	15,989	7,6230
1,500E-05	1,010	20,899	0,5220	4,8066	99,6372	34,904	0,3628	96,0648	20,096	3,9352

EFFICIENCY = STATED = 99,00 COMPUTED = 79,9829 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 85,4759
MMD OF INLET SIZE DISTRIBUTION = 3,987E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2,165E+00
LOG-NORMAL GOODNESS OF FIT = 0,985
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2,063E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1,804E+00
LOG-NORMAL GOODNESS OF FIT = 0,995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11,985

SIGMAG= 0,000 WITH 0,000 %LEAKAGE OVER 4,000 STAGES
NTEMP = 1
RMMD = 6,00
RSIGMA = 2,50
CORR. EFF. = 82,8902
CORRECTED MMD OF EFFLUENT = 2,481E+00
CORRECTED SIGMAP OF EFFLUENT = 1,969E+00
LOG-NORMAL GOODNESS OF FIT = 0,990
CORRECTED PRECIPITATION RATE PARAMETER = 10,97

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF D[illegible]/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
2.440E+00	3.248E+01	2.812E-02	1.040E-02	3.851E-02	4.360E-02	2.500E-07
2.586E+00	3.405E+01	2.548E-01	3.435E-02	2.908E-01	1.022E+01	3.500E-07
2.782E+00	3.610E+01	1.418E+00	7.727E-02	1.495E+00	1.784E+01	4.500E-07
2.995E+00	3.826E+01	4.746E+00	1.401E-01	4.886E+00	2.642E+01	5.500E-07
3.336E+00	4.155E+01	1.020E+01	2.673E-01	1.046E+01	7.953E+01	7.000E-07
3.800E+00	4.576E+01	1.725E+01	4.906E-01	1.774E+01	1.132E+00	9.000E-07
4.272E+00	4.973E+01	2.365E+01	7.550E-01	2.440E+01	1.424E+00	1.100E-06
4.746E+00	5.342E+01	2.392E+01	1.042E+00	2.496E+01	1.661E+00	1.300E-06
5.461E+00	5.849E+01	2.795E+01	1.474E+00	2.942E+01	3.831E+00	1.600E-06
6.407E+00	6.435E+01	3.249E+01	2.040E+00	3.453E+01	4.234E+00	2.000E-06
7.836E+00	7.168E+01	2.966E+01	2.740E+00	3.240E+01	8.791E+00	2.600E-06
9.948E+00	7.984E+01	2.277E+01	3.507E+00	2.627E+01	1.044E+01	3.500E-06
1.339E+01	8.841E+01	1.594E+01	4.075E+00	2.002E+01	1.709E+01	5.000E-06
2.006E+01	9.604E+01	4.326E+00	4.001E+00	8.327E+00	2.114E+01	8.000E-06
3.490E+01	9.964E+01	4.089E-01	4.027E+00	4.436E+00	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 82.8902 % SCA = 1.610E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.011E+04 V

AVG. CURRENT DENSITY = 10.34 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.987E+00 UM INLET SIGMAP = 2.165E+00

OUTLET MMD = 2.481E+00 UM OUTLET SIGMAP = 1.969E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.589	0.008	0.0186	0.0218	55.6046	5.044	44.3954	40.2773	3.202	59.7227
3.500E-07	1.414	0.049	0.1202	0.1179	55.1910	4.986	44.8090	49.5831	4.254	50.4169
4.500E-07	1.320	0.212	0.5166	0.4732	55.7356	5.062	44.2644	53.4867	4.755	46.5133
5.500E-07	1.261	0.597	1.4190	1.2708	56.8430	5.220	43.1570	55.6608	5.052	44.3392
7.000E-07	1.205	2.119	4.8021	4.3230	58.5153	5.465	41.4847	57.5127	5.317	42.4873
9.000E-07	1.159	2.985	6.4184	5.7804	60.9581	5.802	39.0419	59.9404	5.683	40.0556
1.100E-06	1.130	3.582	7.2618	6.5130	63.1894	6.208	36.8106	62.1274	6.031	37.8726
1.300E-06	1.110	3.283	6.2760	5.6841	65.2944	6.574	34.7056	63.9427	6.336	36.0573
1.600E-06	1.090	6.865	12.1309	11.0663	67.9168	7.062	32.0832	66.4259	6.779	33.5741
2.000E-06	1.072	7.164	11.4797	10.5502	70.9042	7.669	29.0958	69.3253	7.341	30.6747
2.600E-06	1.055	11.940	16.6809	15.6689	74.6330	8.521	25.3670	72.6658	8.057	27.3342
3.500E-06	1.041	10.447	12.3687	12.1210	78.5035	9.549	21.4965	75.8344	8.822	24.1656
5.000E-06	1.029	14.925	13.1924	13.6928	83.9504	11.364	16.0496	80.8905	10.280	19.1095
8.000E-06	1.018	14.925	5.7247	7.7055	93.0306	16.546	6.9694	89.2463	13.852	10.7537
1.500E-05	1.010	20.899	1.5461	5.0512	98.6567	26.773	1.3433	94.9656	18.566	5.0344

EFFICIENCY = STATED = 99.00 COMPUTED = 79.9829 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 81.8427
MMD OF INLET SIZE DISTRIBUTION = 3.987E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.165E+00
LOG-NORMAL GOODNESS OF FIT = 0.985
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.273E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.871E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 10.598

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 79.1710
CORRECTED MMD OF EFFLUENT = 2.573E+00
CORRECTED SIGMAP OF EFFLUENT = 1.976E+00
LOG-NORMAL GOODNESS OF FIT = 0.991
CORRECTED PRECIPITATION RATE PARAMETER = 9.74

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
2.440E+00	3.248E+01	3.111E-02	1.074E-02	4.185E-02	4.360E-02	2.500E-07
2.586E+00	3.405E+01	2.836E-01	3.549E-02	3.191E-01	1.022E-01	3.500E-07
2.782E+00	3.610E+01	1.571E+00	7.984E-02	1.651E+00	1.784E-01	4.500E-07
2.995E+00	3.826E+01	5.283E+00	1.447E-01	5.428E+00	2.642E-01	5.500E-07
3.336E+00	4.155E+01	1.143E+01	2.761E-01	1.170E+01	7.953E-01	7.000E-07
3.800E+00	4.576E+01	1.953E+01	5.069E-01	2.003E+01	1.132E+00	9.000E-07
4.272E+00	4.973E+01	2.700E+01	7.801E-01	2.782E+01	1.424E+00	1.100E-06
4.746E+00	5.342E+01	2.764E+01	1.076E+00	2.871E+01	1.661E+00	1.300E-06
5.461E+00	5.849E+01	3.277E+01	1.523E+00	3.429E+01	3.831E+00	1.600E-06
6.407E+00	6.435E+01	3.883E+01	2.107E+00	4.094E+01	4.234E+00	2.000E-06
7.836E+00	7.168E+01	3.651E+01	2.831E+00	3.934E+01	6.791E+00	2.600E-06
9.948E+00	7.984E+01	2.919E+01	3.624E+00	3.281E+01	1.044E+01	3.500E-06
1.339E+01	8.841E+01	2.209E+01	4.211E+00	2.630E+01	1.709E+01	5.000E-06
2.006E+01	9.604E+01	7.613E+00	4.134E+00	1.175E+01	2.114E+01	8.000E-06
3.490E+01	9.964E+01	1.514E+00	4.161E+00	5.675E+00	2.887E+01	1.900E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 79.1710 % SCA = 1.610E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.011E+04 V

AVG. CURRENT DENSITY = 10.34 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.987E+00 UM INLET SIGMAP = 2.165E+00

OUTLET MMD = 2.573E+00 UM OUTLET SIGMAP = 1.976E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX C

OUTPUT DATA FROM EXAMPLE 3

```
**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*     T.E.R.L.-R.T.P. AND SO.R.I.    *
*                                    *
*        REVISION I,JAN. 1, 1978     *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 14   NDATA =  1

DATA ON CARD NUMBER   2

FULL-SCALE,COLD-SIDE ESP: PLANT A: SCA=243FT2/1000ACFM;J=15.9UA/FT2

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  1  NX = 10  NY = 10  NITER =  3  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  2

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

DL =  1.96600 GRN/ACF  PL =  27.0000 FT  ETAO = 99.60000 %  DD =  2270.00 KG/M**3  EPS =  1.000E+02
VRATIO =   1.2000  US = 0.000220 M**2/V-SEC  FPATH =   1.0000  ERD = 1500000. V/M  RHOCGS =  5.00E+10 OHM-CM

DATA ON CARD NUMBER   6

ASNUCK( 1) = 0.00  AZIGGY( 1) = 0.00  AZNUMS( 1) =  3.0
ASNUCK( 2) = 0.10  AZIGGY( 2) = 0.25  AZNUMS( 2) =  3.0


DATA ON CARD NUMBER   7
```

ENDPT(1) = 0.100 UM ENDPT(2) = 0.300 UM ENDPT(3) = 0.500 UM ENDPT(4) = 0.900 UM ENDPT(5) = 1.300 UM
ENDPT(6) = 1.900 UM ENDPT(7) = 3.100 UM ENDPT(8) = 3.900 UM ENDPT(9) = 5.100 UM ENDPT(10) = 6.900 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 10.100 UM ENDPT(12) = 14.900 UM ENDPT(13) = 25.100 UM ENDPT(14) = 29.900 UM

DATA ON CARD NUMBER 9

PRCU(1) = 0.0000 % PRCU(2) = 0.0330 % PRCU(3) = 0.2860 % PRCU(4) = 1.1890 % PRCU(5) = 2.0040 %
PRCU(6) = 3.5240 % PRCU(7) = 7.0480 % PRCU(8) = 8.7000 % PRCU(9) = 10.3520 % PRCU(10) = 12.3340 %

DATA ON CARD NUMBER 10

PRCU(11) = 15.6380 % PRCU(12) = 20.4840 % PRCU(13) = 32.5990 % PRCU(14) = 100.0000 %

DATA ON CARD NUMBER 11

NUMSEC = 3 LSECT(1) = 10 LSECT(2) = 10 LSECT(3) = 10

DATA ON CARD NUMBER 12

AS(1) = 2.6460E+04 FT**2 VOS(1) = 4.0600E+04 V TCS(1) = 2.7300E-01 A WLS(1) = 1.5720E+04 FT
ACS(1) = 8.2500E-02 IN BS(1) = 5.5000E+00 IN NWS(1) = 1.2000E+01

DATA ON CARD NUMBER 13

SYS(1) = 3.6250E+00 IN VGS(1) = 3.2724E+05 FT**3/MIN VGASS(1) = 4.1000E+00 FT/SEC TEMPS(1) = 3.1500E+02 F
PS(1) = 1.0000E+00 ATM VISS(1) = 2.2900E-05 KG/M-SEC LINCS(1) = 9.0000E-01 FT

DATA ON CARD NUMBER 14

AS(2) = 2.6460E+04 FT**2 VOS(2) = 4.2100E+04 V TCS(2) = 4.3300E-01 A WLS(2) = 1.5720E+04 FT
ACS(2) = 8.2500E-02 IN BS(2) = 5.5000E+00 IN NWS(2) = 1.2000E+01

DATA ON CARD NUMBER 15

SYS(2) = 3.6250E+00 IN VGS(2) = 3.2724E+05 FT**3/MIN VGASS(2) = 4.1000E+00 FT/SEC TEMPS(2) = 3.1500E+02 F

PS(2) = 1.0000E+00 ATM VISS(2) = 2.2900E-05 KG/M-SEC LINCS(2) = 9.0000E-01 FT

DATA ON CARD NUMBER 16

AS(3) = 2.6460E+04 FT**2 VOS(3) = 4.2450E+04 V TCS(3) = 5.5800E-01 A WLS(3) = 1.5720E+04 FT

ACS(3) = 8.2500E-02 IN BS(3) = 5.5000E+00 IN NWS(3) = 1.2000E+01

DATA ON CARD NUMBER 17

SYS(3) = 3.6250E+00 IN VGS(3) = 3.2724E+05 FT**3/MIN VGASS(3) = 4.1000E+00 FT/SEC TEMPS(3) = 3.1500E+02 F

PS(3) = 1.0000E+00 ATM VISS(3) = 2.2900E-05 KG/M-SEC LINCS(3) = 9.0000E-01 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,COLD-SIDE ESP: PLANT A; SCA=243FT2/1000ACFM;J=15.9UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M
CURRENT/M = 5.694E-05 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

APPLIED VOLTAGE = 4.060E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M
CURRENT DENSITY = 1.109E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

TOTAL CURRENT = 2.730E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M
DEPOSIT E FIELD = 5.547E+04 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 16.81

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
3.1566	2.906E+05	2.0924E+05	2.1825E+12	11.1	2.29E-05	1.523E-03	5.750E-02	4.82E-07	1.10E-04	1
2.5167	2.906E+05	1.9692E+05	2.7374E+12	11.1	2.27E-05	1.195E-03	4.511E-02	6.23E-07	1.10E-04	2
2.0587	2.906E+05	1.8844E+05	3.3464E+12	11.1	2.22E-05	6.878E-04	2.596E-02	5.22E-07	1.10E-04	3
1.7622	2.906E+05	1.8269E+05	3.9093E+12	11.1	2.13E-05	3.653E-04	1.379E-02	4.11E-07	1.11E-04	4
1.5647	2.906E+05	1.7873E+05	4.4030E+12	11.1	1.91E-05	1.968E-04	7.426E-03	3.38E-07	1.11E-04	5
1.4261	2.906E+05	1.7588E+05	4.8308E+12	11.1	1.20E-05	1.134E-04	4.282E-03	2.93E-07	1.11E-04	6
1.3250	2.906E+05	1.7378E+05	5.1994E+12	11.1	7.46E-06	7.195E-05	2.715E-03	2.64E-07	1.11E-04	7
1.2494	2.906E+05	1.7218E+05	5.5139E+12	11.1	5.13E-06	5.023E-05	1.896E-03	2.42E-07	1.11E-04	8
1.1921	2.906E+05	1.7096E+05	5.7788E+12	11.1	3.90E-06	3.792E-05	1.431E-03	2.25E-07	1.11E-04	9
1.1484	2.906E+05	1.7002E+05	5.9990E+12	11.1	3.19E-06	3.025E-05	1.142E-03	2.10E-07	1.11E-04	10

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M
CURRENT/M = 9.031E-05 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

APPLIED VOLTAGE = 4.210E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M
CURRENT DENSITY = 1.760E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

TOTAL CURRENT = 4.330E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M
DEPOSIT E FIELD = 8.798E+04 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 16.81

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0750	3.014E+05	1.8591E+05	9.8018E+12	17.6	2.68E-06	2.766E-05	1.044E-03	2.22E-07	1.76E-04	11
1.0577	3.014E+05	1.8536E+05	9.9629E+12	17.6	2.41E-06	2.324E-05	8.770E-04	2.10E-07	1.76E-04	12
1.0443	3.014E+05	1.8495E+05	1.0090E+13	17.6	2.28E-06	1.981E-05	7.476E-04	1.98E-07	1.76E-04	13
1.0341	3.014E+05	1.8463E+05	1.0190E+13	17.6	2.17E-06	1.707E-05	6.441E-04	1.86E-07	1.76E-04	14
1.0263	3.014E+05	1.8463E+05	1.0268E+13	17.6	2.08E-06	1.485E-05	5.604E-04	1.74E-07	1.76E-04	15
1.0202	3.014E+05	1.8463E+05	1.0328E+13	17.6	2.00E-06	1.300E-05	4.905E-04	1.64E-07	1.76E-04	16
1.0156	3.014E+05	1.8463E+05	1.0375E+13	17.6	1.93E-06	1.144E-05	4.317E-04	1.53E-07	1.76E-04	17
1.0120	3.014E+05	1.8463E+05	1.0412E+13	17.6	1.87E-06	1.011E-05	3.814E-04	1.44E-07	1.76E-04	18
1.0093	3.014E+05	1.8463E+05	1.0440E+13	17.6	1.80E-06	8.962E-06	3.382E-04	1.35E-07	1.76E-04	19
1.0072	3.014E+05	1.8463E+05	1.0462E+13	17.6	1.74E-06	7.970E-06	3.008E-04	1.26E-07	1.76E-04	20

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M
CURRENT/M = 1.164E-04 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

APPLIED VOLTAGE = 4.245E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M
CURRENT DENSITY = 2.268E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

TOTAL CURRENT = 5.580E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M
DEPOSIT E FIELD = 1.134E+05 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 16.81

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0043	3.039E+05	1.9360E+05	1.3409E+13	22.7	1.69E-06	7.453E-06	2.813E-04	1.24E-07	2.27E-04	21
1.0033	3.039E+05	1.9360E+05	1.3423E+13	22.7	1.63E-06	6.633E-06	2.503E-04	1.16E-07	2.27E-04	22
1.0026	3.039E+05	1.9360E+05	1.3433E+13	22.7	1.57E-06	5.916E-06	2.233E-04	1.09E-07	2.27E-04	23
1.0020	3.039E+05	1.9360E+05	1.3441E+13	22.7	1.52E-06	5.287E-06	1.995E-04	1.02E-07	2.27E-04	24
1.0015	3.039E+05	1.9360E+05	1.3447E+13	22.7	1.47E-06	4.727E-06	1.784E-04	9.49E-08	2.27E-04	25
1.0012	3.039E+05	1.9360E+05	1.3452E+13	22.7	1.43E-06	4.235E-06	1.598E-04	8.86E-08	2.27E-04	26
1.0009	3.039E+05	1.9360E+05	1.3455E+13	22.7	1.38E-06	3.798E-06	1.433E-04	8.27E-08	2.27E-04	27
1.0007	3.039E+05	1.9360E+05	1.3458E+13	22.7	1.34E-06	3.412E-06	1.288E-04	7.72E-08	2.27E-04	28
1.0005	3.039E+05	1.9360E+05	1.3460E+13	22.7	1.30E-06	3.068E-06	1.15AE-04	7.19E-08	2.27E-04	29
1.0004	3.039E+05	1.9360E+05	1.3462E+13	22.7	1.26E-06	2.763E-06	1.043E-04	6.71E-08	2.27E-04	30

EST. EFFICIENCY = 99.60 UNCORRECTED COMPUTED EFFICIENCY = 99.37

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,COLD-SIDE ESP; PLANT A; SCA=243FT2/1000ACFM;J=15.9UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M
CURRENT/M = 5.694E-05 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

APPLIED VOLTAGE = 4.060E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M
CURRENT DENSITY = 1.109E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

TOTAL CURRENT = 2.730E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M
DEPOSIT E FIELD = 5.547E+04 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 15.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
2.9945	2.906E+05	2.0637E+05	2.3006E+12	11.1	2.29E-05	1.542E-03	5.821E-02	5.03E-07	1.10E-04	1
2.4206	2.906E+05	1.9518E+05	2.8460E+12	11.1	2.26E-05	1.193E-03	4.502E-02	6.34E-07	1.10E-04	2
2.0061	2.906E+05	1.8744E+05	3.4340E+12	11.1	2.22E-05	6.816E-04	2.572E-02	5.25E-07	1.10E-04	3
1.7356	2.906E+05	1.8216E+05	3.9694E+12	11.1	2.13E-05	3.610E-04	1.362E-02	4.13E-07	1.11E-04	4
1.5533	2.906E+05	1.7849E+05	4.4353E+12	11.1	1.89E-05	1.944E-04	7.335E-03	3.39E-07	1.11E-04	5
1.4239	2.906E+05	1.7584E+05	4.8384E+12	11.1	1.1AE-05	1.122E-04	4.234E-03	2.93E-07	1.11E-04	6
1.3282	2.906E+05	1.7384E+05	5.1869E+12	11.1	7.3AE-06	7.128E-05	2.690E-03	2.64E-07	1.11E-04	7
1.2557	2.906E+05	1.7232E+05	5.4863E+12	11.1	5.08E-06	4.985E-05	1.881E-03	2.42E-07	1.11E-04	8
1.2000	2.906E+05	1.7113E+05	5.7412E+12	11.1	3.8AE-06	3.76AE-05	1.422E-03	2.25E-07	1.11E-04	9
1.1568	2.906E+05	1.7021E+05	5.9556E+12	11.1	3.1AE-06	3.009E-05	1.136E-03	2.10E-07	1.11E-04	10

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M

APPLIED VOLTAGE = 4.210E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M

TOTAL CURRENT = 4.330E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M

CURRENT/M = 9.031E-05 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

CURRENT DENSITY = 1.760E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

DEPOSIT E FIELD = 8.798E+04 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 15.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0805	3.014E+05	1.8607E+05	9.7525E+12	17.6	2.67E-06	2.752E-05	1.039E-03	2.21E-07	1.76E-04	11
1.0628	3.014E+05	1.8553E+05	9.9149E+12	17.6	2.40E-06	2.313E-05	8.729E-04	2.10E-07	1.76E-04	12
1.0490	3.014E+05	1.8510E+05	1.0045E+13	17.6	2.27E-06	1.972E-05	7.442E-04	1.97E-07	1.76E-04	13
1.0383	3.014E+05	1.8476E+05	1.0149E+13	17.6	2.17E-06	1.699E-05	6.413E-04	1.85E-07	1.76E-04	14
1.0299	3.014E+05	1.8476E+05	1.0231E+13	17.6	2.08E-06	1.479E-05	5.580E-04	1.74E-07	1.76E-04	15
1.0234	3.014E+05	1.8476E+05	1.0296E+13	17.6	2.00E-06	1.294E-05	4.885E-04	1.63E-07	1.76E-04	16
1.0183	3.014E+05	1.8476E+05	1.0348E+13	17.6	1.93E-06	1.139E-05	4.300E-04	1.53E-07	1.76E-04	17
1.0143	3.014E+05	1.8476E+05	1.0388E+13	17.6	1.86E-06	1.007E-05	3.799E-04	1.43E-07	1.76E-04	18
1.0112	3.014E+05	1.8476E+05	1.0420E+13	17.6	1.80E-06	8.92AE-06	3.369E-04	1.34E-07	1.76E-04	19
1.0088	3.014E+05	1.8476E+05	1.0445E+13	17.6	1.74E-06	7.939E-06	2.996E-04	1.26E-07	1.76E-04	20

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2
WIRE TO PLATE = 1.397E-01 M
CURRENT/M = 1.164E-04 AMP/M
1/2 WIRE TO WIRE = 9.208E-02 M
TEMPERATURE = 430.000 K
ION MOBILITY = 3.463E-04 M2/VOLT-SEC
DUST WEIGHT = 6.969E-01 KG/SEC

APPLIED VOLTAGE = 4.245E+04 VOLTS
CORONA WIRE RADIUS = 2.096E-03 M
CURRENT DENSITY = 2.268E-04 AMP/M2
GAS FLOW RATE = 1.548E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 5.335E+02 M/SEC
LENGTH INCR. =0.27450000 M

TOTAL CURRENT = 5.580E-01 AMPS
CORONA WIRE LENGTH = 4.795E+03 M
DEPOSIT E FIELD = 1.134E+05 VOLT/M
GAS VELOCITY = 1.250E+00 M/SEC
VISCOSITY = 2.290E-05 KG/M-SEC
PART. PATH PARAM. = 8.246E-08 M
INPUT EFF./INCR. = 15.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0054	3.039E+05	1.9363E+05	1.3395E+13	22.7	1.68E-06	7.422E-06	2.801E-04	1.24E-07	2.27E-04	21
1.0042	3.039E+05	1.9363E+05	1.3411E+13	22.7	1.62E-06	6.606E-06	2.493E-04	1.16E-07	2.27E-04	22
1.0033	3.039E+05	1.9363E+05	1.3423E+13	22.7	1.57E-06	5.892E-06	2.224E-04	1.08E-07	2.27E-04	23
1.0026	3.039E+05	1.9363E+05	1.3433E+13	22.7	1.52E-06	5.266E-06	1.987E-04	1.01E-07	2.27E-04	24
1.0020	3.039E+05	1.9363E+05	1.3440E+13	22.7	1.47E-06	4.709E-06	1.777E-04	9.46E-08	2.27E-04	25
1.0016	3.039E+05	1.9363E+05	1.3446E+13	22.7	1.42E-06	4.219E-06	1.592E-04	8.84E-08	2.27E-04	26
1.0012	3.039E+05	1.9363E+05	1.3451E+13	22.7	1.38E-06	3.783E-06	1.428E-04	8.25E-08	2.27E-04	27
1.0010	3.039E+05	1.9363E+05	1.3454E+13	22.7	1.34E-06	3.399E-06	1.283E-04	7.69E-08	2.27E-04	28
1.0008	3.039E+05	1.9363E+05	1.3457E+13	22.7	1.30E-06	3.057E-06	1.154E-04	7.17E-08	2.27E-04	29
1.0006	3.039E+05	1.9363E+05	1.3459E+13	22.7	1.26E-06	2.753E-06	1.039E-04	6.69E-08	2.27E-04	30

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.7000E-06	0.1100E-05	0.1600E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	0.5293	0.5206	0.4911	0.4693	0.4555	0.4436	0.4373	0.4339
2	0.7611	0.7536	0.7120	0.6794	0.6576	0.6388	0.6293	0.6244
3	0.9222	0.9229	0.8609	0.8104	0.7773	0.7500	0.7370	0.7308
4	1.0587	1.0651	0.9861	0.9085	0.8596	0.8215	0.8046	0.7969
5	1.1669	1.1677	1.0774	0.9919	0.9244	0.8725	0.8508	0.8413
6	1.2554	1.2469	1.1432	1.0502	0.9793	0.9122	0.8847	0.8733
7	1.3299	1.3110	1.1942	1.0931	1.0184	0.9455	0.9113	0.8975
8	1.3939	1.3647	1.2357	1.1268	1.0478	0.9721	0.9330	0.9167
9	1.4498	1.4106	1.2706	1.1544	1.0712	0.9920	0.9512	0.9324
10	1.4992	1.4505	1.3005	1.1777	1.0906	1.0079	0.9644	0.9453
11	1.5706	1.5100	1.3468	1.2156	1.1234	1.0368	0.9921	0.9710
12	1.6301	1.5584	1.3836	1.2449	1.1480	1.0573	1.0088	0.9886
13	1.6809	1.5991	1.4141	1.2687	1.1677	1.0732	1.0216	0.9982
14	1.7252	1.6342	1.4401	1.2888	1.1840	1.0861	1.0319	1.0055
15	1.7644	1.6650	1.4627	1.3060	1.1978	1.0969	1.0405	1.0117
16	1.7996	1.6924	1.4827	1.3212	1.2099	1.1062	1.0479	1.0172
17	1.8314	1.7170	1.5005	1.3346	1.2206	1.1143	1.0543	1.0220
18	1.8604	1.7394	1.5166	1.3467	1.2301	1.1216	1.0600	1.0220
19	1.8871	1.7598	1.5313	1.3577	1.2388	1.1281	1.0652	1.0220
20	1.9117	1.7786	1.5448	1.3678	1.2466	1.1340	1.0652	1.0220
21	1.9412	1.8014	1.5613	1.3802	1.2565	1.1416	1.0719	1.0285
22	1.9683	1.8221	1.5762	1.3914	1.2654	1.1484	1.0719	1.0285
23	1.9932	1.8411	1.5899	1.4017	1.2735	1.1545	1.0719	1.0285
24	2.0163	1.8587	1.6025	1.4111	1.2809	1.1601	1.0719	1.0285
25	2.0378	1.8750	1.6141	1.4197	1.2877	1.1601	1.0719	1.0285
26	2.0579	1.8903	1.6250	1.4278	1.2940	1.1601	1.0719	1.0285
27	2.0768	1.9045	1.6351	1.4353	1.2940	1.1601	1.0719	1.0285
28	2.0947	1.9180	1.6447	1.4424	1.2940	1.1601	1.0719	1.0285
29	2.1116	1.9307	1.6537	1.4424	1.2940	1.1601	1.0719	1.0285
30	2.1276	1.9427	1.6622	1.4424	1.2940	1.1601	1.0719	1.0285

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04
1	0.4311	0.4289	0.4277	0.4272	0.4270
2	0.6208	0.6184	0.6174	0.6170	0.6170
3	0.7265	0.7241	0.7232	0.7230	0.7229
4	0.7919	0.7893	0.7884	0.7883	0.7883
5	0.8355	0.8326	0.8318	0.8317	0.8317
6	0.8664	0.8632	0.8624	0.8623	0.8622
7	0.8895	0.8859	0.8850	0.8849	0.8849
8	0.9074	0.9033	0.9024	0.9023	0.9023
9	0.9217	0.9171	0.9161	0.9160	0.9160
10	0.9334	0.9283	0.9272	0.9271	0.9271
11	0.9583	0.9532	0.9521	0.9520	0.9520
12	0.9754	0.9699	0.9687	0.9686	0.9686
13	0.9870	0.9814	0.9803	0.9802	0.9802
14	0.9928	0.9889	0.9879	0.9878	0.9878
15	0.9958	0.9919	0.9918	0.9917	0.9917

16	0.9958	0.9919	0.9918	0.9917	0.9917
17	0.9958	0.9919	0.9918	0.9917	0.9917
18	0.9958	0.9919	0.9918	0.9917	0.9917
19	0.9958	0.9919	0.9918	0.9917	0.9917
20	0.9958	0.9919	0.9918	0.9917	0.9917
21	1.0021	0.9996	0.9992	0.9991	0.9991
22	1.0021	0.9996	0.9992	0.9991	0.9991
23	1.0021	0.9996	0.9992	0.9991	0.9991
24	1.0021	0.9996	0.9992	0.9991	0.9991
25	1.0021	0.9996	0.9992	0.9991	0.9991
26	1.0021	0.9996	0.9992	0.9991	0.9991
27	1.0021	0.9996	0.9992	0.9991	0.9991
28	1.0021	0.9996	0.9992	0.9991	0.9991
29	1.0021	0.9996	0.9992	0.9991	0.9991
30	1.0021	0.9996	0.9992	0.9991	0.9991

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.7000E-06	0.1100E-05	0.1600E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	0.94287E-18	0.28449E-17	0.75571E-17	0.17331E-16	0.35188E-16	0.83125E-16	0.16024E-15	0.26252E-15
2	0.13559E-17	0.41186E-17	0.10957E-16	0.25090E-16	0.50804E-16	0.11970E-15	0.23057E-15	0.37780E-15
3	0.16428E-17	0.50437E-17	0.1324RE-16	0.29927E-16	0.60052E-16	0.14053E-15	0.27004E-15	0.44217E-15
4	0.18860E-17	0.58206E-17	0.15174E-16	0.33551E-16	0.66406E-16	0.15394E-15	0.29479E-15	0.48215E-15
5	0.20787E-17	0.63813E-17	0.16580E-16	0.36630E-16	0.71415E-16	0.16349E-15	0.31172E-15	0.50905E-15
6	0.22364E-17	0.68142E-17	0.17592E-16	0.38783E-16	0.75655E-16	0.17093E-15	0.32416E-15	0.52837E-15
7	0.23692E-17	0.71647E-17	0.18377E-16	0.40365E-16	0.78676E-16	0.17717E-15	0.33388E-15	0.54303E-15
8	0.24832E-17	0.74579E-17	0.19016E-16	0.41610E-16	0.80944E-16	0.18215E-15	0.34185E-15	0.55465E-15
9	0.25828E-17	0.77087E-17	0.19552E-16	0.42631E-16	0.82752E-16	0.18589E-15	0.34850E-15	0.56412E-15
10	0.26707E-17	0.79269E-17	0.20012E-16	0.43493E-16	0.84248E-16	0.18887E-15	0.35337E-15	0.57194E-15
11	0.27480E-17	0.82517E-17	0.20725E-16	0.44890E-16	0.86785E-16	0.19429E-15	0.36352E-15	0.58747E-15
12	0.29039E-17	0.85163E-17	0.21292E-16	0.45972E-16	0.88688E-16	0.19813E-15	0.36963E-15	0.59816E-15
13	0.29944E-17	0.87389E-17	0.21761E-16	0.46852E-16	0.90205E-16	0.20110E-15	0.37430E-15	0.60393E-15
14	0.30734E-17	0.89308E-17	0.22161E-16	0.47592E-16	0.91463E-16	0.20351E-15	0.37807E-15	0.60836E-15
15	0.31433E-17	0.90990E-17	0.22509E-16	0.48230E-16	0.92536E-16	0.20554E-15	0.38123E-15	0.61214E-15
16	0.32059E-17	0.92487E-17	0.22816E-16	0.48789E-16	0.93469E-16	0.20728E-15	0.38393E-15	0.61545E-15
17	0.32626E-17	0.93833E-17	0.23091E-16	0.49286E-16	0.94293E-16	0.20881E-15	0.38630E-15	0.61838E-15
18	0.33143E-17	0.95054E-17	0.23339E-16	0.49733E-16	0.95031E-16	0.21016E-15	0.38839E-15	0.61838E-15
19	0.33618E-17	0.96172E-17	0.23565E-16	0.50139E-16	0.95698E-16	0.21138E-15	0.39028E-15	0.61838E-15
20	0.34057E-17	0.97201E-17	0.23773E-16	0.50510E-16	0.96306E-16	0.21249E-15	0.39028E-15	0.61838E-15
21	0.34583E-17	0.98443E-17	0.24026E-16	0.50970E-16	0.97071E-16	0.21392E-15	0.39275E-15	0.62230E-15
22	0.35064E-17	0.99575E-17	0.24256E-16	0.51385E-16	0.97758E-16	0.21519E-15	0.39275E-15	0.62230E-15
23	0.35507E-17	0.10061E-16	0.24466E-16	0.51762E-16	0.98381E-16	0.21634E-15	0.39275E-15	0.62230E-15
24	0.35919E-17	0.10158E-16	0.24660E-16	0.52109E-16	0.98951E-16	0.21738E-15	0.39275E-15	0.62230E-15
25	0.36302E-17	0.10247E-16	0.24839E-16	0.52430E-16	0.99476E-16	0.21738E-15	0.39275E-15	0.62230E-15
26	0.36661E-17	0.10330E-16	0.25006E-16	0.52727E-16	0.99962E-16	0.21738E-15	0.39275E-15	0.62230E-15
27	0.36998E-17	0.10408E-16	0.25162E-16	0.53005E-16	0.99962E-16	0.21738E-15	0.39275E-15	0.62230E-15
28	0.37316E-17	0.10482E-16	0.25309E-16	0.53266E-16	0.99962E-16	0.21738E-15	0.39275E-15	0.62230E-15
29	0.37617E-17	0.10551E-16	0.25448E-16	0.53266E-16	0.99962E-16	0.21738E-15	0.39275E-15	0.62230E-15
30	0.37902E-17	0.10617E-16	0.25578E-16	0.53266E-16	0.99962E-16	0.21738E-15	0.39275E-15	0.62230E-15

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04
1	0.46333E-15	0.92477E-15	0.19937E-14	0.50962E-14	0.96313E-14
2	0.66724E-15	0.13333E-14	0.28776E-14	0.73611E-14	0.13915E-13
3	0.78089E-15	0.15611E-14	0.3370RE-14	0.86247E-14	0.16304E-13
4	0.85113E-15	0.17016E-14	0.36750E-14	0.94041E-14	0.17778E-13
5	0.89798E-15	0.17950E-14	0.38770E-14	0.99217E-14	0.18756E-13
6	0.93122E-15	0.18610E-14	0.40195E-14	0.10287E-13	0.19446E-13
7	0.95603E-15	0.19099E-14	0.41250E-14	0.10557E-13	0.19957E-13
8	0.97529E-15	0.19475E-14	0.42060E-14	0.10764E-13	0.20349E-13
9	0.99068E-15	0.19773E-14	0.42701E-14	0.10928E-13	0.20659E-13
10	0.10032E-14	0.20014E-14	0.43218E-14	0.11060E-13	0.20909E-13
11	0.10300E-14	0.20550E-14	0.44377E-14	0.11357E-13	0.21470E-13
12	0.10483E-14	0.20910E-14	0.45154E-14	0.11556E-13	0.21846E-13
13	0.10608E-14	0.21160E-14	0.45692E-14	0.11694E-13	0.22107E-13
14	0.10671E-14	0.21321E-14	0.46047E-14	0.11785E-13	0.22279E-13
15	0.10703E-14	0.21386E-14	0.46226E-14	0.11831E-13	0.22367E-13
16	0.10703E-14	0.21386E-14	0.46226E-14	0.11831E-13	0.22367E-13
17	0.10703E-14	0.21386E-14	0.46226E-14	0.11831E-13	0.22367E-13
18	0.10703E-14	0.21386E-14	0.46226E-14	0.11831E-13	0.22367E-13
19	0.10703E-14	0.21386E-14	0.46226E-14	0.11831E-13	0.22367E-13

20	0.10703E-14	0.21386E-14	0.46224E-14	0.11831E-13	0.22367E-13
21	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
22	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
23	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
24	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
25	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
26	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
27	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
28	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
29	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13
30	0.10771E-14	0.21551E-14	0.46572E-14	0.11920E-13	0.22534E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.7060	0.4596	95.6337	6.565	4.3663	95.4127	6.462	4.5873
4.000E-07	1.530	0.253	7.7149	4.6397	94.1103	5.938	5.8897	93.9591	5.885	6.0409
7.000E-07	1.297	0.903	23.7497	14.5819	94.9201	6.248	5.0799	94.6806	6.151	5.3194
1.100E-06	1.188	0.815	15.2607	10.1210	96.3834	6.960	3.6166	95.9093	6.702	4.0907
1.600E-06	1.130	1.520	19.0143	13.5163	97.5839	7.806	2.4161	97.0708	7.402	2.9292
2.500E-06	1.083	3.524	22.9679	18.8810	98.7412	9.173	1.2588	98.2351	8.464	1.7649
3.500E-06	1.059	1.652	5.9857	6.9689	99.3002	10.404	0.6998	98.6104	8.966	1.3896
4.500E-06	1.046	1.652	3.5711	6.6668	99.5825	11.487	0.4175	98.6706	9.059	1.3294
6.000E-06	1.035	1.982	0.8603	5.9268	99.9162	14.853	0.0838	99.0150	9.687	0.9850
8.500E-06	1.024	3.304	0.0861	6.4448	99.9950	20.751	0.0050	99.3575	10.583	0.6425
1.250E-05	1.017	4.846	0.0025	5.1520	99.9999	33.981	0.0001	99.6498	11.855	0.3502
2.000E-05	1.010	12.115	0.0062	4.1915	99.9999	54.024	0.0001	99.8860	14.209	0.1140
2.750E-05	1.008	67.401	0.0346	2.4497	99.9999	74.070	0.0001	99.9880	18.934	0.0120

EFFICIENCY = STATED = 99.37 COMPUTED = 99.3736 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8069
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.336E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.919E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.103

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 3.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.6706
CORRECTED MMD OF EFFLUENT = 2.687E+00
CORRECTED SIGMAP OF EFFLUENT = 2.816E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 11.98

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
2.702E+00	7.243E+01	2.146E-01	1.086E-02	2.254E-01	5.350E-02	2.000E-07
2.814E+00	7.387E+01	4.772E+00	1.225E-01	4.895E+00	2.806E-01	4.000E-07
3.377E+00	8.003E+01	1.277E+01	6.019E-01	1.337E+01	1.586E+00	7.000E-07
4.223E+00	8.666E+01	1.311E+01	1.719E+00	1.483E+01	2.834E+00	1.100E-06
5.296E+00	9.200E+01	1.583E+01	3.362E+00	1.919E+01	5.720E+00	1.600E-06
7.223E+00	9.681E+01	1.482E+01	5.960E+00	2.078E+01	1.30AE+01	2.500E-06
9.331E+00	9.883E+01	8.238E+00	8.120E+00	1.636E+01	8.358E+00	3.500E-06
1.149E+01	9.958E+01	4.206E+00	9.186E+00	1.339E+01	1.105E+01	4.500E-06
1.485E+01	9.992E+01	8.992E-01	9.667E+00	1.057E+01	1.310E+01	6.000E-06
2.075E+01	9.999E+01	7.141E-02	9.044E+00	9.115E+00	1.545E+01	8.500E-06
3.398E+01	1.000E+02	2.022E-03	7.140E+00	7.142E+00	1.245E+01	1.250E-05
5.402E+01	1.000E+02	3.769E-03	4.331E+00	4.335E+00	1.013E+01	2.000E-05
7.407E+01	1.000E+02	6.250E-02	7.544E+00	7.606E+00	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.6706 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.172E+04 V

AVG. CURRENT DENSITY = 17.12 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.687E+00 UM OUTLET SIGMAP = 2.816E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.4509	0.3301	92.3311	5.384	7.6689	91.9336	5.278	8.0664
4.000E-07	1.530	0.253	4.4488	3.1822	90.1301	4.855	9.8699	89.8582	4.798	10.1418
7.000E-07	1.297	0.903	14.5658	10.6218	90.9462	5.036	9.0538	90.5155	4.939	9.4845
1.100E-06	1.188	0.815	10.5527	8.2078	92.7324	5.497	7.2676	91.8797	5.264	8.1203
1.600E-06	1.130	1.520	15.3888	12.4518	94.3174	6.013	5.6826	93.3947	5.697	6.6053
2.500E-06	1.083	3.524	25.0413	21.4094	96.0115	6.755	3.9885	95.1014	6.324	4.8986
3.500E-06	1.059	1.652	9.1685	8.9240	96.8849	7.273	3.1151	95.6443	6.570	4.3557
4.500E-06	1.046	1.652	7.9239	8.8757	97.3078	7.579	2.6922	95.6679	6.582	4.3321
6.000E-06	1.035	1.982	5.1532	7.5712	98.5406	8.863	1.4594	96.9199	7.297	3.0801
8.500E-06	1.024	3.304	4.6876	7.9611	99.2037	10.133	0.7963	98.0571	8.263	1.9429
1.250E-05	1.017	4.846	2.3997	5.4557	99.7220	12.340	0.2780	99.0922	9.859	0.9078
2.000E-05	1.010	12.115	0.1864	3.2093	99.9914	19.619	0.0086	99.7864	12.892	0.2136
2.750E-05	1.008	67.401	0.0323	1.7999	99.9997	74.070	0.0003	99.9785	17.703	0.0215

EFFICIENCY = STATED = 99.37 COMPUTED = 99.3736 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4387
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.044E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.230E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 10.866

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 3.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.1937
CORRECTED MMD OF EFFLUENT = 2.924E+00
CORRECTED SIGMAP OF EFFLUENT = 2.600E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 10.11

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
2.702E+00	7.243E+01	3.769E-01	1.953E-02	3.964E-01	5.350E-02	2.000E-07
2.814E+00	7.387E+01	7.997E+00	2.203E-01	8.217E+00	2.806E-01	4.000E-07
3.377E+00	8.003E+01	2.275E+01	1.082E+00	2.384E+01	1.586E+00	7.000E-07
4.223E+00	8.666E+01	2.635E+01	3.092E+00	2.944E+01	2.834E+00	1.100E-06
5.296E+00	9.200E+01	3.734E+01	6.046E+00	4.328E+01	5.720E+00	1.600E-06
7.223E+00	9.681E+01	4.697E+01	1.072E+01	5.769E+01	1.308E+01	2.500E-06
9.331E+00	9.883E+01	3.667E+01	1.460E+01	5.128E+01	8.358E+00	3.500E-06
1.149E+01	9.958E+01	2.712E+01	1.652E+01	4.364E+01	1.105E+01	4.500E-06
1.485E+01	9.992E+01	1.565E+01	1.739E+01	3.304E+01	1.310E+01	6.000E-06
2.075E+01	9.999E+01	1.130E+01	1.626E+01	2.756E+01	1.545E+01	8.500E-06
3.398E+01	1.000E+02	5.667E+00	1.284E+01	1.851E+01	1.245E+01	1.250E-05
5.402E+01	1.000E+02	3.282E-01	7.789E+00	8.118E+00	1.013E+01	2.000E-05
7.407E+01	1.000E+02	1.695E-01	1.357E+01	1.374E+01	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 99.1937 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.172E+04 V

AVG. CURRENT DENSITY = 17.12 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.924E+00 UM OUTLET SIGMAP = 2.600E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX D

OUTPUT DATA FROM EXAMPLE 4

```
**********************************
*                                *
*        E.P.A. ESP MODEL        *
*                                *
*   T.E.R.L.-R.T.P. AND SD.R.I.  *
*                                *
*     REVISION I,JAN. 1, 197A    *
*                                *
**********************************
```

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 15 NDATA = 1

DATA ON CARD NUMBER 2

FULL-SCALE,HOT-SIDE ESP; PLANT B;SCA=390FT2/1000ACFM;J=34.3UA/FT2

DATA ON CARD NUMBER 3

NEST = 1 NDIST = 1 NVI = 1 NX = 10 NY = 10 NITER = 3 NCALC = 0 NRAPD = 1 NEFF = 1 NTEMP = 2 NONID = 2

DATA ON CARD NUMBER 4

NN = 10 NUMINC = 20

DATA ON CARD NUMBER 5

DL = 2.51000 GRN/ACF PL = 36.0000 FT ETAD = 99.60000 % DD = 2270.00 KG/M**3 EPS = 1.000E+02
VRATIO = 1.2000 US = 0.000220 M**2/V-SEC FPATH = 1.0000 EBD = 1500000. V/M RHOCGS = 1.90E+10 OHM-CM

DATA ON CARD NUMBER 6

ASNUCK(1) = 0.00 AZIGGY(1) = 0.00 AZNUMS(1) = 4.0
ASNUCK(2) = 0.10 AZIGGY(2) = 0.25 AZNUMS(2) = 4.0

DATA ON CARD NUMBER 7

ENDPT(1) = 0.200 UM ENDPT(2) = 0.400 UM ENDPT(3) = 0.700 UM ENDPT(4) = 1.000 UM ENDPT(5) = 1.500 UM
ENDPT(6) = 2.000 UM ENDPT(7) = 3.000 UM ENDPT(8) = 4.000 UM ENDPT(9) = 5.000 UM ENDPT(10) = 7.000 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 10.000 UM ENDPT(12) = 15.000 UM ENDPT(13) = 25.000 UM ENDPT(14) = 30.000 UM ENDPT(15) = 100.000 UM

DATA ON CARD NUMBER 9

PRCU(1) = 0.0000 % PRCU(2) = 0.1479 % PRCU(3) = 0.5742 % PRCU(4) = 1.0092 % PRCU(5) = 1.7226 %
PRCU(6) = 2.7493 % PRCU(7) = 6.5251 % PRCU(8) = 9.4832 % PRCU(9) = 11.1362 % PRCU(10) = 13.0503 %

DATA ON CARD NUMBER 10

PRCU(11) = 15.6255 % PRCU(12) = 20.1844 % PRCU(13) = 30.9727 % PRCU(14) = 35.4968 % PRCU(15) = 100.0000 %

DATA ON CARD NUMBER 11

NUMSEC = 4 LSECT(1) = 9 LSECT(2) = 9 LSECT(3) = 9 LSECT(4) = 9

DATA ON CARD NUMBER 12

AS(1) = 4.2120E+04 FT**2 VOS(1) = 3.5880E+04 V TCS(1) = 1.2200E+00 A WLS(1) = 5.6160E+04 FT
ACS(1) = 5.4500E-02 IN BS(1) = 4.5000E+00 IN NWS(1) = 1.2000E+01

DATA ON CARD NUMBER 13

SYS(1) = 4.5000E+00 IN VGS(1) = 4.3207E+05 FT**3/MIN VGASS(1) = 3.7958E+00 FT/SEC TEMPS(1) = 6.2400E+02 F
PS(1) = 1.0000E+00 ATM VISS(1) = 2.8000E-05 KG/M-SEC LINCS(1) = 1.0000E+00 FT

DATA ON CARD NUMBER 14

AS(2) = 4.2120E+04 FT**2 VOS(2) = 3.3950E+04 V TCS(2) = 1.6720E+00 A WLS(2) = 5.6160E+04 FT
ACS(2) = 5.4500E-02 IN BS(2) = 4.5000E+00 IN NWS(2) = 1.2000E+01

DATA ON CARD NUMBER 15

SYS(2) = 4.5000E+00 IN VGS(2) = 4.3207E+05 FT**3/MIN VGASS(2) = 3.7958E+00 FT/SEC TEMPS(2) = 6.2400E+02 F
PS(2) = 1.0000E+00 ATM VISS(2) = 2.8000E-05 KG/M-SEC LINCS(2) = 1.0000E+00 FT

DATA ON CARD NUMBER 16

AS(3) = 4.2120E+04 FT**2 VOS(3) = 2.9130E+04 V TCS(3) = 1.4200E+00 A WLS(3) = 5.6160E+04 FT
ACS(3) = 5.4500E-02 IN BS(3) = 4.5000E+00 IN NWS(3) = 1.2000E+01

DATA ON CARD NUMBER 17

SYS(3) = 4.5000E+00 IN VGS(3) = 4.3207E+05 FT**3/MIN VGASS(3) = 3.7958E+00 FT/SEC TEMPS(3) = 6.2400E+02 F
PS(3) = 1.0000E+00 ATM VISS(3) = 2.8000E-05 KG/M-SEC LINCS(3) = 1.0000E+00 FT

DATA ON CARD NUMBER 18

AS(4) = 4.2120E+04 FT**2 VOS(4) = 2.7500E+04 V TCS(4) = 1.4600E+00 A WLS(4) = 5.6160E+04 FT
ACS(4) = 5.4500E-02 IN BS(4) = 4.5000E+00 IN NWS(4) = 1.2000E+01

DATA ON CARD NUMBER 19

SYS(4) = 4.5000E+00 IN VGS(4) = 4.3207E+05 FT**3/MIN VGASS(4) = 3.7958E+00 FT/SEC TEMPS(4) = 6.2400E+02 F
PS(4) = 1.0000E+00 ATM VISS(4) = 2.8000E-05 KG/M-SEC LINCS(4) = 1.0000E+00 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,HOT-SIDE ESP: PLANT B;SCA=390FT2/1000ACFM;J=34,3UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2,7450 M

COLLECTION AREA = 3,917E+03 M2
WIRE TO PLATE = 1,143E-01 M
CURRENT/M = 7,123E-05 AMP/M
1/2 WIRE TO WIRE = 1,143E-01 M
TEMPERATURE = 601,667 K
ION MOBILITY = 4,846E-04 M2/VOLT-SEC
DUST WEIGHT = 1,175E+00 KG/SEC

APPLIED VOLTAGE = 3,588E+04 VOLTS
CORONA WIRE RADIUS = 1,384E-03 M
CURRENT DENSITY = 3,115E-04 AMP/M2
GAS FLOW RATE = 2,044E+02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 6,311E+02 M/SEC
LENGTH INCR. =0,30500000 M

TOTAL CURRENT = 1,220E+00 AMPS
CORONA WIRE LENGTH = 1,713E+04 M
DEPOSIT E FIELD = 5,918E+04 VOLT/M
GAS VELOCITY = 1,158E+00 M/SEC
VISCOSITY = 2,800E-05 KG/M-SEC
PART. PATH PARAM. = 1,154E-07 M
INPUT EFF./INCR. = 14,22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1,5597	3,139E+05	1,8186E+05	8,2047E+12	31,1	4,22E-05	4,136E-03	1,165E-01	1,27E-06	3,10E-04	1
1,3636	3,139E+05	1,7508E+05	9,3842E+12	31,1	2,03E-05	6,995E-04	1,971E-02	7,01E-07	3,11E-04	2
1,2650	3,139E+05	1,7156E+05	1,0116E+13	31,1	1,11E-05	2,530E-04	7,128E-03	5,52E-07	3,11E-04	3
1,1984	3,139E+05	1,6915E+05	1,0678E+13	31,1	6,87E-06	1,454E-04	4,098E-03	4,72E-07	3,11E-04	4
1,1502	3,139E+05	1,6738E+05	1,1126E+13	31,1	4,60E-06	9,767E-05	2,752E-03	4,14E-07	3,11E-04	5
1,1145	3,139E+05	1,6606E+05	1,1482E+13	31,1	3,52E-06	7,105E-05	2,002E-03	3,68E-07	3,11E-04	6
1,0876	3,139E+05	1,6505E+05	1,1766E+13	31,1	3,11E-06	5,455E-05	1,537E-03	3,31E-07	3,11E-04	7
1,0673	3,139E+05	1,6429E+05	1,1990E+13	31,1	2,83E-06	4,343E-05	1,224E-03	2,99E-07	3,11E-04	8
1,0518	3,139E+05	1,6370E+05	1,2167E+13	31,1	2,61E-06	3,543E-05	9,982E-04	2,71E-07	3,11E-04	9

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2,7450 M

COLLECTION AREA = 3,917E+03 M2
WIRE TO PLATE = 1,143E-01 M
CURRENT/M = 9,761E-05 AMP/M
1/2 WIRE TO WIRE = 1,143E-01 M
TEMPERATURE = 601,667 K
ION MOBILITY = 4,846E-04 M2/VOLT-SEC
DUST WEIGHT = 1,175E+00 KG/SEC

APPLIED VOLTAGE = 3,395E+04 VOLTS
CORONA WIRE RADIUS = 1,384E-03 M
CURRENT DENSITY = 4,268E-04 AMP/M2
GAS FLOW RATE = 2,044E+02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 6,311E+02 M/SEC
LENGTH INCR. =0,30500000 M

TOTAL CURRENT = 1,672E+00 AMPS
CORONA WIRE LENGTH = 1,713E+04 M
DEPOSIT E FIELD = 8,110E+04 VOLT/M
GAS VELOCITY = 1,158E+00 M/SEC
VISCOSITY = 2,800E-05 KG/M-SEC
PART. PATH PARAM. = 1,154E-07 M
INPUT EFF./INCR. = 14,22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1,0276	2,970E+05	1,7245E+05	1,8038E+13	42,7	2,46E-06	3,085E-05	8,690E-04	2,59E-07	4,27E-04	10
1,0212	2,970E+05	1,7245E+05	1,8151E+13	42,7	2,38E-06	2,563E-05	7,221E-04	2,35E-07	4,27E-04	11
1,0163	2,970E+05	1,7245E+05	1,8238E+13	42,7	2,31E-06	2,150E-05	6,057E-04	2,13E-07	4,27E-04	12
1,0125	2,970E+05	1,7245E+05	1,8306E+13	42,7	2,24E-06	1,816E-05	5,117E-04	1,93E-07	4,27E-04	13
1,0096	2,970E+05	1,7245E+05	1,8358E+13	42,7	2,19E-06	1,543E-05	4,348E-04	1,75E-07	4,27E-04	14
1,0074	2,970E+05	1,7245E+05	1,8398E+13	42,7	2,14E-06	1,315E-05	3,706E-04	1,59E-07	4,27E-04	15
1,0057	2,970E+05	1,7245E+05	1,8429E+13	42,7	2,09E-06	1,126E-05	3,172E-04	1,44E-07	4,27E-04	16
1,0044	2,970E+05	1,7245E+05	1,8453E+13	42,7	2,04E-06	9,670E-06	2,724E-04	1,31E-07	4,27E-04	17
1,0034	2,970E+05	1,7245E+05	1,8472E+13	42,7	2,00E-06	8,328E-06	2,346E-04	1,19E-07	4,27E-04	18

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2,7450 M

COLLECTION AREA = 3,917E+03 M2
WIRE TO PLATE = 1,143E-01 M

APPLIED VOLTAGE = 2,913E+04 VOLTS
CORONA WIRE RADIUS = 1,384E-03 M

TOTAL CURRENT = 1,420E+00 AMPS
CORONA WIRE LENGTH = 1,713E+04 M

CURRENT/M = 8.290E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

CURRENT DENSITY = 3.625E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

DEPOSIT E FIELD = 6.888E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0027	2.549E+05	1.5313E+05	1.8297E+13	36.3	1.96E-06	6.432E-06	1.812E-04	9.63E-08	3.62E-04	19
1.0021	2.549E+05	1.5313E+05	1.8308E+13	36.3	1.93E-06	5.651E-06	1.592E-04	8.80E-08	3.62E-04	20
1.0016	2.549E+05	1.5313E+05	1.8316E+13	36.3	1.89E-06	4.975E-06	1.402E-04	8.05E-08	3.62E-04	21
1.0013	2.549E+05	1.5313E+05	1.8322E+13	36.3	1.86E-06	4.387E-06	1.236E-04	7.36E-08	3.62E-04	22
1.0010	2.549E+05	1.5313E+05	1.8328E+13	36.3	1.82E-06	3.876E-06	1.092E-04	6.74E-08	3.62E-04	23
1.0008	2.549E+05	1.5313E+05	1.8332E+13	36.3	1.79E-06	3.429E-06	9.662E-05	6.18E-08	3.62E-04	24
1.0006	2.549E+05	1.5313E+05	1.8335E+13	36.3	1.75E-06	3.039E-06	8.562E-05	5.66E-08	3.62E-04	25
1.0005	2.549E+05	1.5313E+05	1.8337E+13	36.3	1.69E-06	2.697E-06	7.598E-05	5.18E-08	3.62E-04	26
1.0004	2.549E+05	1.5313E+05	1.8339E+13	36.3	1.64E-06	2.396E-06	6.751E-05	4.74E-08	3.62E-04	27

CALCULATION IS IN SECTION NO. = 4 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 8.524E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 2.750E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.727E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.460E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 7.082E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0003	2.406E+05	1.5096E+05	1.9975E+13	37.3	1.59E-06	2.104E-06	5.926E-05	4.28E-08	3.73E-04	28
1.0002	2.406E+05	1.5096E+05	1.9976E+13	37.3	1.54E-06	1.877E-06	5.289E-05	3.93E-08	3.73E-04	29
1.0002	2.406E+05	1.5096E+05	1.9977E+13	37.3	1.49E-06	1.677E-06	4.725E-05	3.61E-08	3.73E-04	30
1.0001	2.406E+05	1.5096E+05	1.9978E+13	37.3	1.44E-06	1.500E-06	4.227E-05	3.32E-08	3.73E-04	31
1.0001	2.406E+05	1.5096E+05	1.9979E+13	37.3	1.40E-06	1.343E-06	3.785E-05	3.05E-08	3.73E-04	32
1.0001	2.406E+05	1.5096E+05	1.9979E+13	37.3	1.35E-06	1.204E-06	3.393E-05	2.80E-08	3.73E-04	33
1.0001	2.406E+05	1.5096E+05	1.9980E+13	37.3	1.30E-06	1.081E-06	3.045E-05	2.58E-08	3.73E-04	34
1.0001	2.406E+05	1.5096E+05	1.9980E+13	37.3	1.26E-06	9.711E-07	2.736E-05	2.37E-08	3.73E-04	35
1.0000	2.406E+05	1.5096E+05	1.9980E+13	37.3	1.22E-06	8.733E-07	2.460E-05	2.18E-08	3.73E-04	36

EST. EFFICIENCY = 99.60 UNCORRECTED COMPUTED EFFICIENCY = 99.85

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,HOT-SIDE ESP: PLANT B;SCA=390FT2/1000ACFM;J=34.3UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 7.123E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 3.588E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.115E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC

TOTAL CURRENT = 1.220E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 5.918E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M

DUST WEIGHT = 1.175E+00 KG/SEC LENGTH INCR. =0.30500000 M INPUT EFF./INCR. = 16.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.6516	3.139E+05	1.8494E+05	7.7483E+12	31.1	4.21E-05	4.144E-03	1.167E-01	1.26E-06	3.10E-04	1
1.4114	3.139E+05	1.7675E+05	9.0670E+12	31.1	2.00E-05	6.952E-04	1.959E-02	6.97E-07	3.11E-04	2
1.2916	3.139E+05	1.7252E+05	9.9077E+12	31.1	1.10E-05	2.516E-04	7.089E-03	5.49E-07	3.11E-04	3
1.2123	3.139E+05	1.6966E+05	1.0556E+13	31.1	6.82E-06	1.447E-04	4.077E-03	4.69E-07	3.11E-04	4
1.1564	3.139E+05	1.6761E+05	1.1066E+13	31.1	4.58E-06	9.720E-05	2.738E-03	4.12E-07	3.11E-04	5
1.1160	3.139E+05	1.6612E+05	1.1467E+13	31.1	3.51E-06	7.073E-05	1.993E-03	3.67E-07	3.11E-04	6
1.0864	3.139E+05	1.6500E+05	1.1779E+13	31.1	3.11E-06	5.432E-05	1.530E-03	3.30E-07	3.11E-04	7
1.0645	3.139E+05	1.6419E+05	1.2021E+13	31.1	2.83E-06	4.328E-05	1.219E-03	2.98E-07	3.11E-04	8
1.0483	3.139E+05	1.6357E+05	1.2207E+13	31.1	2.61E-06	3.532E-05	9.952E-04	2.70E-07	3.11E-04	9

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 9.761E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 3.395E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 4.268E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.672E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 8.110E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 16.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0250	2.970E+05	1.7233E+05	1.8082E+13	42.7	2.46E-06	3.077E-05	8.670E-04	2.59E-07	4.27E-04	10
1.0187	2.970E+05	1.7233E+05	1.8195E+13	42.7	2.38E-06	2.561E-05	7.214E-04	2.34E-07	4.27E-04	11
1.0140	2.970E+05	1.7233E+05	1.8279E+13	42.7	2.31E-06	2.148E-05	6.052E-04	2.13E-07	4.27E-04	12
1.0105	2.970E+05	1.7233E+05	1.8343E+13	42.7	2.24E-06	1.815E-05	5.114E-04	1.93E-07	4.27E-04	13
1.0078	2.970E+05	1.7233E+05	1.8391E+13	42.7	2.19E-06	1.542E-05	4.346E-04	1.75E-07	4.27E-04	14
1.0059	2.970E+05	1.7233E+05	1.8426E+13	42.7	2.14E-06	1.315E-05	3.704E-04	1.59E-07	4.27E-04	15
1.0044	2.970E+05	1.7233E+05	1.8453E+13	42.7	2.09E-06	1.125E-05	3.171E-04	1.44E-07	4.27E-04	16
1.0033	2.970E+05	1.7233E+05	1.8474E+13	42.7	2.04E-06	9.668E-06	2.724E-04	1.31E-07	4.27E-04	17
1.0025	2.970E+05	1.7233E+05	1.8489E+13	42.7	2.00E-06	8.326E-06	2.346E-04	1.19E-07	4.27E-04	18

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 8.290E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 2.913E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.625E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.420E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 6.888E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 16.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0019	2.549E+05	1.5311E+05	1.8311E+13	36.3	1.96E-06	6.435E-06	1.813E-04	9.64E-08	3.62E-04	19
1.0014	2.549E+05	1.5311E+05	1.8320E+13	36.3	1.93E-06	5.653E-06	1.593E-04	8.80E-08	3.62E-04	20
1.0011	2.549E+05	1.5311E+05	1.8326E+13	36.3	1.89E-06	4.977E-06	1.402E-04	8.05E-08	3.62E-04	21
1.0008	2.549E+05	1.5311E+05	1.8331E+13	36.3	1.86E-06	4.389E-06	1.236E-04	7.36E-08	3.62E-04	22
1.0006	2.549E+05	1.5311E+05	1.8334E+13	36.3	1.82E-06	3.877E-06	1.092E-04	6.74E-08	3.62E-04	23
1.0005	2.549E+05	1.5311E+05	1.8337E+13	36.3	1.78E-06	3.431E-06	9.665E-05	6.18E-08	3.62E-04	24
1.0004	2.549E+05	1.5311E+05	1.8339E+13	36.3	1.75E-06	3.040E-06	8.565E-05	5.66E-08	3.62E-04	25
1.0003	2.549E+05	1.5311E+05	1.8341E+13	36.3	1.69E-06	2.698E-06	7.600E-05	5.18E-08	3.62E-04	26
1.0002	2.549E+05	1.5311E+05	1.8342E+13	36.3	1.64E-06	2.397E-06	6.754E-05	4.74E-08	3.62E-04	27

CALCULATION IS IN SECTION NO. = 4 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2	APPLIED VOLTAGE = 2.750E+04 VOLTS	TOTAL CURRENT = 1.460E+00 AMPS
WIRE TO PLATE = 1.143E-01 M	CORONA WIRE RADIUS = 1.384E-03 M	CORONA WIRE LENGTH = 1.713E+04 M
CURRENT/M = 8.524E-05 AMP/M	CURRENT DENSITY = 3.727E-04 AMP/M2	DEPOSIT E FIELD = 7.082E+04 VOLT/M
1/2 WIRE TO WIRE = 1.143E-01 M	GAS FLOW RATE = 2.044E+02 M3/SEC	GAS VELOCITY = 1.158E+00 M/SEC
TEMPERATURE = 601.667 K	PRESSURE = 1.000 ATM	VISCOSITY = 2.800E-05 KG/M-SEC
ION MOBILITY = 4.846E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 6.311E+02 M/SEC	PART. PATH PARAM. = 1.154E-07 M
DUST WEIGHT = 1.175E+00 KG/SEC	LENGTH INCR. =0.30500000 M	INPUT EFF./INCR. = 16.55

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0002	2.406E+05	1.5095E+05	1.9978E+13	37.3	1.59E-06	2.105E-06	5.929E-05	4.29E-08	3.73E-04	28
1.0001	2.406E+05	1.5095E+05	1.9978E+13	37.3	1.54E-06	1.878E-06	5.291E-05	3.93E-08	3.73E-04	29
1.0001	2.406E+05	1.5095E+05	1.9979E+13	37.3	1.49E-06	1.678E-06	4.728E-05	3.61E-08	3.73E-04	30
1.0001	2.406E+05	1.5095E+05	1.9979E+13	37.3	1.44E-06	1.501E-06	4.229E-05	3.32E-08	3.73E-04	31
1.0001	2.406E+05	1.5095E+05	1.9980E+13	37.3	1.39E-06	1.344E-06	3.787E-05	3.05E-08	3.73E-04	32
1.0000	2.406E+05	1.5095E+05	1.9980E+13	37.3	1.35E-06	1.205E-06	3.395E-05	2.80E-08	3.73E-04	33
1.0000	2.406E+05	1.5095E+05	1.9980E+13	37.3	1.30E-06	1.082E-06	3.047E-05	2.58E-08	3.73E-04	34
1.0000	2.406E+05	1.5095E+05	1.9980E+13	37.3	1.26E-06	9.717E-07	2.738E-05	2.37E-08	3.73E-04	35
1.0000	2.406E+05	1.5095E+05	1.9980E+13	37.3	1.22E-06	8.739E-07	2.462E-05	2.19E-08	3.73E-04	36

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.3000E-06	0.5500E-06	0.8500E-06	0.1250E-05	0.1750E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	1.3047	1.3047	1.2956	1.2285	1.1782	1.1379	1.1118	1.0989
2	1.6730	1.6608	1.5842	1.4830	1.3982	1.3188	1.2618	1.2362
3	1.8818	1.8410	1.7255	1.6001	1.4987	1.4065	1.3373	1.3014
4	2.0276	1.9616	1.8190	1.6752	1.5609	1.4579	1.3799	1.3362
5	2.1393	2.0519	1.8886	1.7302	1.6057	1.4941	1.4094	1.3602
6	2.2295	2.1239	1.9438	1.7735	1.6406	1.5219	1.4318	1.3785
7	2.3050	2.1835	1.9894	1.8091	1.6690	1.5445	1.4497	1.3933
8	2.3696	2.2341	2.0281	1.8391	1.6930	1.5633	1.4647	1.4056
9	2.4259	2.2780	2.0616	1.8650	1.7136	1.5794	1.4775	1.4161
10	2.4893	2.3240	2.0940	1.8879	1.7300	1.5906	1.4849	1.4213
11	2.5441	2.3639	2.1225	1.9082	1.7446	1.6007	1.4918	1.4213
12	2.5924	2.3991	2.1477	1.9263	1.7578	1.6099	1.4918	1.4213
13	2.6353	2.4306	2.1704	1.9426	1.7698	1.6183	1.4918	1.4213
14	2.6741	2.4590	2.1910	1.9575	1.7808	1.6260	1.4918	1.4213
15	2.7094	2.4849	2.2098	1.9712	1.7909	1.6260	1.4918	1.4213
16	2.7417	2.5087	2.2271	1.9838	1.8003	1.6260	1.4918	1.4213
17	2.7715	2.5307	2.2431	1.9955	1.8090	1.6260	1.4918	1.4213
18	2.7992	2.5512	2.2581	2.0065	1.8090	1.6260	1.4918	1.4213
19	2.8174	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
20	2.8348	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
21	2.8514	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
22	2.8673	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
23	2.8825	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
24	2.8971	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
25	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
26	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
27	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
28	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
29	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
30	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
31	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
32	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
33	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
34	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
35	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213
36	2.9112	2.5621	2.2645	2.0101	1.8090	1.6260	1.4918	1.4213

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04	0.6500E-04
1	1.0896	1.0840	1.0818	1.0813	1.0813	1.0812
2	1.2195	1.2105	1.2076	1.2071	1.2070	1.2070
3	1.2757	1.2625	1.2585	1.2579	1.2578	1.2578
4	1.3067	1.2914	1.2864	1.2856	1.2856	1.2856
5	1.3222	1.3054	1.3017	1.3010	1.3010	1.3010
6	1.3347	1.3101	1.3053	1.3048	1.3048	1.3048
7	1.3451	1.3101	1.3053	1.3048	1.3048	1.3048
8	1.3540	1.3101	1.3053	1.3048	1.3048	1.3048
9	1.3617	1.3101	1.3053	1.3048	1.3048	1.3048

10	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
11	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
12	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
13	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
14	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
15	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
16	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
17	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
18	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
19	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
20	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
21	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
22	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
23	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
24	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
25	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
26	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
27	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
28	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
29	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
30	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
31	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
32	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
33	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
34	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
35	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048
36	1.3648	1.3101	1.3053	1.3048	1.3048	1.3048

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.3000E-06	0.5500E-06	0.8500E-06	0.1250E-05	0.1750E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	0.39845E-17	0.10717E-16	0.23619E-16	0.46871E-16	0.86782E-16	0.16956E-15	0.32332E-15	0.52726E-15
2	0.51093E-17	0.13642E-16	0.28880E-16	0.56581E-16	0.10298E-15	0.19652E-15	0.36694E-15	0.59314E-15
3	0.57469E-17	0.15121E-16	0.31457E-16	0.61049E-16	0.11039E-15	0.20959E-15	0.38889E-15	0.62439E-15
4	0.61921E-17	0.16112E-16	0.33161E-16	0.63914E-16	0.11497E-15	0.21725E-15	0.4012AE-15	0.64108E-15
5	0.65333E-17	0.16854E-16	0.34430E-16	0.66015E-16	0.11827E-15	0.22265E-15	0.40985E-15	0.65260E-15
6	0.68088E-17	0.17445E-16	0.35436E-16	0.67667E-16	0.12084E-15	0.22680E-15	0.41636E-15	0.66139E-15
7	0.70392E-17	0.17934E-16	0.36267E-16	0.69022E-16	0.12293E-15	0.23015E-15	0.42159E-15	0.66847E-15
8	0.72364E-17	0.18350E-16	0.36972E-16	0.70167E-16	0.12469E-15	0.23296E-15	0.42594E-15	0.67438E-15
9	0.74084E-17	0.18711E-16	0.37583E-16	0.71155E-16	0.12621E-15	0.23536E-15	0.42965E-15	0.67943E-15
10	0.76022E-17	0.19088E-16	0.38175E-16	0.72030E-16	0.12742E-15	0.23703E-15	0.43182E-15	0.68194E-15
11	0.77696E-17	0.19416E-16	0.38693E-16	0.72803E-16	0.12850E-15	0.23853E-15	0.43380E-15	0.68194E-15
12	0.79168E-17	0.19705E-16	0.39153E-16	0.73494E-16	0.12947E-15	0.23990E-15	0.43380E-15	0.68194E-15
13	0.80481E-17	0.19964E-16	0.39567E-16	0.74118E-16	0.13035E-15	0.24115E-15	0.43380E-15	0.68194E-15
14	0.81665E-17	0.20197E-16	0.39942E-16	0.74686E-16	0.13116E-15	0.24230E-15	0.43380E-15	0.68194E-15
15	0.82741E-17	0.20410E-16	0.40285E-16	0.75208E-16	0.13191E-15	0.24230E-15	0.43380E-15	0.68194E-15
16	0.83729E-17	0.20606E-16	0.40600E-16	0.75689E-16	0.13260E-15	0.24230E-15	0.43380E-15	0.68194E-15
17	0.84640E-17	0.20786E-16	0.40893E-16	0.76136E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
18	0.85486E-17	0.20954E-16	0.41165E-16	0.76553E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
19	0.86042E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
20	0.86572E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
21	0.87079E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
22	0.87564E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
23	0.88029E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
24	0.88475E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
25	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
26	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
27	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
28	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
29	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
30	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
31	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
32	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
33	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
34	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
35	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15
36	0.88905E-17	0.21044E-16	0.41282E-16	0.76690E-16	0.13324E-15	0.24230E-15	0.43380E-15	0.68194E-15

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04	0.6500E-04
1	0.92817E-15	0.18514E-14	0.39936E-14	0.10215E-13	0.19310E-13	0.10786E-12
2	0.10388E-14	0.20674E-14	0.44577E-14	0.11403E-13	0.21556E-13	0.12041E-12
3	0.10867E-14	0.21562E-14	0.46457E-14	0.11883E-13	0.22463E-13	0.12548E-12
4	0.11130E-14	0.22056E-14	0.47487E-14	0.12146E-13	0.22960E-13	0.12825E-12
5	0.11263E-14	0.22296E-14	0.48053E-14	0.12291E-13	0.23234E-13	0.12978E-12
6	0.11369E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
7	0.11458E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
8	0.11534E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
9	0.11599E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
10	0.11625E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
11	0.11625E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
12	0.11625E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12
13	0.11625E-14	0.22375E-14	0.48184E-14	0.12327E-13	0.23303E-13	0.13017E-12

14	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
15	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
16	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
17	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
18	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
19	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
20	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
21	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
22	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
23	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
24	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
25	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
26	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
27	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
28	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
29	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
30	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
31	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
32	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
33	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
34	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
35	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12
36	0,11625E-14	0,22375E-14	0,48184E-14	0,12327E-13	0,23303E-13	0,13017E-12

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
3.000E-07	2.040	0.148	2.0502	0.6084	99.6613	7.419	0.3387	99.5861	7.157	0.4139
5.500E-07	1.540	0.426	11.4186	3.3765	99.3455	6.559	0.6545	99.2031	6.303	0.7969
8.500E-07	1.343	0.435	11.3780	3.9566	99.3608	6.590	0.6392	99.0848	6.122	0.9152
1.250E-06	1.232	0.713	13.8509	6.3868	99.5256	6.979	0.4744	99.0992	6.143	0.9008
1.750E-06	1.166	1.027	13.7531	7.1391	99.6726	7.463	0.3274	99.3003	6.472	0.6997
2.500E-06	1.116	3.776	29.8952	15.5536	99.8065	8.149	0.1935	99.5855	7.155	0.4145
3.500E-06	1.083	2.958	12.5926	10.9696	99.8960	8.958	0.1040	99.6269	7.292	0.3731
4.500E-06	1.064	1.653	3.9978	7.9501	99.9409	9.696	0.0591	99.5161	6.953	0.4839
6.000E-06	1.048	1.914	0.6526	11.1989	99.9917	12.251	0.0083	99.4113	6.698	0.5887
8.500E-06	1.034	2.575	0.0687	10.9771	99.9993	15.571	0.0007	99.5711	7.111	0.4289
1.250E-05	1.023	4.559	0.0185	9.8491	99.9999	22.561	0.0001	99.7826	7.997	0.2174
2.000E-05	1.015	10.788	0.0438	7.5021	99.9999	35.767	0.0001	99.9300	9.476	0.0700
2.750E-05	1.011	4.524	0.0184	1.5290	99.9999	48.981	0.0001	99.9660	10.417	0.0340
6.500E-05	1.004	64.503	0.2618	3.0030	99.9999	115.059	0.0001	99.9953	13.002	0.0047

EFFICIENCY = STATED = 99.85 COMPUTED = 99.8518 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9756
MMD OF INLET SIZE DISTRIBUTION = 5.172E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.542E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.533E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.850E+00
LOG-NORMAL GOODNESS OF FIT = 0.985
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 10.848

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 2
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.8994
CORRECTED MMD OF EFFLUENT = 4.418E+00
CORRECTED SIGMAP OF EFFLUENT = 2.756E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 9.00

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.312E+00	9.211E+01	2.112E-01	4.689E-02	2.581E-01	1.458E-01	3.000E-07
3.338E+00	9.226E+01	1.457E+00	3.170E-01	1.774E+00	7.960E-01	5.500E-07
3.745E+00	9.434E+01	2.27AE+00	9.838E-01	3.262E+00	1.574E+00	8.500E-07
4.383E+00	9.653E+01	2.440E+00	2.192E+00	4.632E+00	3.988E+00	1.250E-06
5.201E+00	9.815E+01	3.414E+00	3.883E+00	7.297E+00	5.012E+00	1.750E-06
6.417E+00	9.927E+01	5.265E+00	6.015E+00	1.128E+01	1.094E+01	2.500E-06
8.034E+00	9.979E+01	3.126E+00	8.087E+00	1.121E+01	1.044E+01	3.500E-06
9.696E+00	9.994E+01	1.279E+00	9.197E+00	1.048E+01	9.208E+00	4.500E-06
1.225E+01	9.999E+01	1.385E-01	9.649E+00	9.787E+00	1.457E+01	6.000E-06
1.557E+01	1.000E+02	1.376E-02	9.036E+00	9.050E+00	1.446E+01	8.500E-06
2.256E+01	1.000E+02	3.259E-03	7.143E+00	7.146E+00	1.299E+01	1.250E-05
3.577E+01	1.000E+02	6.121E-03	4.319E+00	4.325E+00	9.898E+00	2.000E-05
4.898E+01	1.000E+02	7.192E-03	2.466E+00	2.473E+00	2.017E+00	2.750E-05
1.151E+02	1.000E+02	1.553E-02	7.333E-01	7.488E-01	3.961E+00	6.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.8994 % SCA = 7.667E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.161E+04 V

AVG. CURRENT DENSITY = 36.84 NA/CM**2

RESISTIVITY = 1.900E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 5.172E+01 UM INLET SIGMAP = 5.542E+00

OUTLET MMD = 4.418E+00 UM OUTLET SIGMAP = 2.756E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
3.000E-07	2.040	0.148	1.1341	0.5290	98.8314	5.803	1.1686	98.5939	5.562	1.4061
5.500E-07	1.540	0.426	5.4898	2.6158	98.0375	5.127	1.9625	97.5878	4.858	2.4122
8.500E-07	1.343	0.435	5.7690	3.2010	97.9789	5.089	2.0211	97.1072	4.621	2.8928
1.250E-06	1.232	0.713	8.1239	5.5927	98.2646	5.288	1.7354	96.9182	4.539	3.0818
1.750E-06	1.166	1.027	9.8018	6.8704	98.5449	5.517	1.4551	97.3691	4.745	2.6309
2.500E-06	1.116	3.776	28.9662	17.9322	98.8309	5.803	1.1691	98.1330	5.192	1.8670
3.500E-06	1.083	2.958	18.7758	13.6732	99.0327	6.050	0.9673	98.1828	5.228	1.8172
4.500E-06	1.064	1.653	9.5349	9.3374	99.1209	6.175	0.8791	97.7794	4.966	2.2206
6.000E-06	1.048	1.914	5.5673	11.0819	99.5567	7.068	0.4433	97.7239	4.934	2.2761
8.500E-06	1.034	2.575	5.4773	10.9823	99.6759	7.476	0.3241	98.3235	5.333	1.6765
1.250E-05	1.023	4.559	1.2825	8.4578	99.9571	10.115	0.0429	99.2707	6.418	0.7293
2.000E-05	1.015	10.788	0.0324	6.0638	99.9995	35.767	0.0005	99.7790	7.976	0.2210
2.750E-05	1.011	4.524	0.0029	1.2358	99.9999	48.981	0.0001	99.8926	8.917	0.1074
6.500E-05	1.004	64.503	0.0420	2.4266	99.9999	115.059	0.0001	99.9852	11.503	0.0148

EFFICIENCY = STATED = 99.85 COMPUTED = 99.8518 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8476
MMD OF INLET SIZE DISTRIBUTION = 5.172E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.542E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.333E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.064E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.460

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 2
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.6069
CORRECTED MMD OF EFFLUENT = 4.310E+00
CORRECTED SIGMAP OF EFFLUENT = 2.594E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 7.22

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.312E+00	9.211E+01	7.287E-01	1.481E-01	8.768E-01	1.458E-01	3.000E-07
3.338E+00	9.226E+01	4.369E+00	1.001E+00	5.370E+00	7.960E-01	5.500E-07
3.745E+00	9.434E+01	7.204E+00	3.107E+00	1.031E+01	1.574E+00	8.500E-07
4.383E+00	9.653E+01	8.924E+00	6.923E+00	1.585E+01	3.988E+00	1.250E-06
5.201E+00	9.815E+01	1.517E+01	1.226E+01	2.744E+01	5.012E+00	1.750E-06
6.417E+00	9.927E+01	3.182E+01	1.899E+01	5.081E+01	1.094E+01	2.500E-06
8.034E+00	9.979E+01	2.907E+01	2.554E+01	5.461E+01	1.044E+01	3.500E-06
9.696E+00	9.994E+01	1.903E+01	2.904E+01	4.808E+01	9.208E+00	4.500E-06
1.225E+01	9.999E+01	7.369E+00	3.047E+01	3.784E+01	1.457E+01	6.000E-06
1.557E+01	1.000E+02	6.839E+00	2.854E+01	3.538E+01	1.446E+01	8.500E-06
2.256E+01	1.000E+02	1.409E+00	2.256E+01	2.397E+01	1.299E+01	1.250E-05
3.577E+01	1.000E+02	2.825E-02	1.364E+01	1.367E+01	9.898E+00	2.000E-05
4.898E+01	1.000E+02	7.192E-03	7.788E+00	7.795E+00	2.017E+00	2.750E-05
1.151E+02	1.000E+02	1.553E-02	2.316E+00	2.331E+00	3.961E+00	6.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 99.6069 % SCA = 7.667E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.161E+04 V

AVG. CURRENT DENSITY = 36.84 NA/CM**2

RESISTIVITY = 1.900E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 5.172E+01 UM INLET SIGMAP = 5.542E+00

OUTLET MMD = 4.310E+00 UM OUTLET SIGMAP = 2.594E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX E

OUTPUT DATA FROM EXAMPLE 5

```
**************************************
*                                    *
*        E.P.A. ESP MODEL            *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*      REVISION I,JAN. 1, 1978       *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 10   NDATA =  1

DATA ON CARD NUMBER   2

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;HMD=2UM;SIGMAP=2.5

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  2  NVI =  1  NX = 10  NY = 10  NITER =  5  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  1

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

DL =  0.01500 GRN/ACF  PL =  10.0000 FT  ETAO = 99.00000 %  DD =   100.00 KG/M**3  EPS =  5.100E+00
VRATIO =   1.0300  US = 0.000165 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  1.00E+09 OHM-CM

DATA ON CARD NUMBER   6

ABNUCK( 1) = 0.00  AZIGGY( 1) = 0.00  AZNUMS( 1) =  4.0

DATA ON CARD NUMBER   7

ENDPT( 1) =    0.100 UM   ENDPT( 2) =    0.300 UM   ENDPT( 3) =    0.500 UM   ENDPT( 4) =    0.700 UM   ENDPT( 5) =    0.900 UM
```

ENDPT(6) = 1.100 UM ENDPT(7) = 2.900 UM ENDPT(8) = 5.100 UM ENDPT(9) = 6.900 UM ENDPT(10) = 9.100 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 10.900 UM ENDPT(12) = 19.100 UM ENDPT(13) = 30.900 UM ENDPT(14) = 49.100 UM

DATA ON CARD NUMBER 9

D50 = 2.0000 UM SIGMAP = 2.5000

DATA ON CARD NUMBER 10

NUMSEC = 3 LSECT(1) = 3 LSECT(2) = 3 LSECT(3) = 6

DATA ON CARD NUMBER 11

AS(1) = 6.2500E+00 FT**2 VOS(1) = 4.6000E+04 V TCS(1) = 1.5000E-04 A WLS(1) = 6.2500E+00 FT
ACS(1) = 4.6875E-02 IN BS(1) = 5.0000E+00 IN NWS(1) = 5.0000E+00

DATA ON CARD NUMBER 12

SYS(1) = 2.5000E+00 IN VGS(1) = 2.0000E+02 FT**3/MIN VGASS(1) = 3.2000E+00 FT/SEC TEMPS(1) = 7.6800E+01 F
PS(1) = 1.0000E+00 ATM VISS(1) = 1.8000E-05 KG/M-SEC LINCS(1) = 8.3333E-01 FT

DATA ON CARD NUMBER 13

AS(2) = 6.2500E+00 FT**2 VOS(2) = 4.5800E+04 V TCS(2) = 1.5000E-04 A WLS(2) = 6.2500E+00 FT
ACS(2) = 4.6875E-02 IN BS(2) = 5.0000E+00 IN NWS(2) = 5.0000E+00

DATA ON CARD NUMBER 14

SYS(2) = 2.5000E+00 IN VGS(2) = 2.0000E+02 FT**3/MIN VGASS(2) = 3.2000E+00 FT/SEC TEMPS(2) = 7.6800E+01 F
PS(2) = 1.0000E+00 ATM VISS(2) = 1.8000E-05 KG/M-SEC LINCS(2) = 8.3333E-01 FT

DATA ON CARD NUMBER 15

AS(3) = 1.2500E+01 FT**2 VOS(3) = 4.4400E+04 V TCS(3) = 3.0000E-04 A WLS(3) = 1.2500E+01 FT

ACS(3) = 4.6875E-02 IN RS(3) = 5.0000E+00 IN NWS(3) = 1.0000E+01

DATA ON CARD NUMBER 16

SYS(3) = 2.5000E+00 IN VGS(3) = 2.0000E+02 FT**3/MIN VGASS(3) = 3.2000E+00 FT/SEC TEMPS(3) = 7.6800E+01 F
PS(3) = 1.0000E+00 ATM VISS(3) = 1.8000E-05 KG/M-SEC LINCS(3) = 8.3333E-01 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=2UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
2.4449	3.622E+05	3.0900E+05	1.0130E+13	25.8	2.74E-06	6.622E-06	1.940E-04	5.53E-07	2.58E-04	1
1.8824	3.622E+05	3.0900E+05	1.3156E+13	25.8	1.99E-06	6.107E-06	1.789E-04	8.49E-07	2.57E-04	2
1.5236	3.622E+05	2.9652E+05	1.6254E+13	25.8	1.78E-06	4.448E-06	1.303E-04	8.13E-07	2.57E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.3100	3.606E+05	2.8493E+05	1.8988E+13	25.8	1.63E-06	3.271E-06	9.583E-05	7.33E-07	2.57E-04	4
1.1852	3.606E+05	2.7966E+05	2.0986E+13	25.8	1.52E-06	2.513E-06	7.362E-05	6.64E-07	2.57E-04	5
1.1110	3.606E+05	2.7638E+05	2.2388E+13	25.8	1.43E-06	1.974E-06	5.782E-05	5.99E-07	2.57E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0647	3.496E+05	2.6732E+05	2.4100E+13	25.8	1.35E-06	1.534E-06	4.495E-05	5.25E-07	2.58E-04	7
1.0390	3.496E+05	2.6616E+05	2.4694E+13	25.8	1.28E-06	1.245E-06	3.647E-05	4.73E-07	2.58E-04	8
1.0236	3.496E+05	2.6545E+05	2.5067E+13	25.8	1.21E-06	1.020E-06	2.989E-05	4.27E-07	2.58E-04	9

1.0143	3.496E+05	2.6545E+05	2.5297E+13	25.8	1.14E-06	8.440E-07	2.472E-05	3.86E-07	2.58E-04	10
1.0087	3.496E+05	2.6545E+05	2.5438E+13	25.8	1.07E-06	7.923E-07	2.057E-05	3.49E-07	2.58E-04	11
1.0053	3.496E+05	2.6545E+05	2.5524E+13	25.8	9.99E-07	5.875E-07	1.721E-05	3.15E-07	2.58E-04	12

EST. EFFICIENCY = 99.00 UNCORRECTED COMPUTED EFFICIENCY = 89.86

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=2UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.37

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.7873	3.622E+05	3.0854E+05	1.3857E+13	25.8	2.74E-06	7.224E-06	2.116E-04	6.30E-07	2.57E-04	1
1.5788	3.622E+05	2.9909E+05	1.5686E+13	25.8	1.97E-06	5.907E-06	1.730E-04	8.57E-07	2.57E-04	2
1.4173	3.622E+05	2.9147E+05	1.7474E+13	25.8	1.76E-06	4.310E-06	1.263E-04	8.16E-07	2.57E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.37

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.3000	3.606E+05	2.8452E+05	1.9134E+13	25.8	1.62E-06	3.215E-06	9.417E-05	7.40E-07	2.57E-04	4
1.2174	3.606E+05	2.8105E+05	2.0433E+13	25.8	1.51E-06	2.480E-06	7.264E-05	6.69E-07	2.57E-04	5
1.1579	3.606E+05	2.7846E+05	2.1482E+13	25.8	1.42E-06	1.948E-06	5.708E-05	6.02E-07	2.57E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.37

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1,1115	3,496E+05	2,6941E+05	2,3086E+13	25,8	1,34E-06	1,513E-06	4,433E-05	5,26E-07	2,58E-04	7
1,0816	3,496E+05	2,6808E+05	2,3723E+13	25,8	1,27E-06	1,226E-06	3,592E-05	4,73E-07	2,58E-04	8
1,0598	3,496E+05	2,6710E+05	2,4211E+13	25,8	1,20E-06	1,003E-06	2,939E-05	4,26E-07	2,58E-04	9
1,0439	3,496E+05	2,6638E+05	2,4579E+13	25,8	1,13E-06	8,279E-07	2,425E-05	3,83E-07	2,58E-04	10
1,0323	3,496E+05	2,6585E+05	2,4856E+13	25,8	1,06E-06	6,881E-07	2,016E-05	3,46E-07	2,58E-04	11
1,0237	3,496E+05	2,6585E+05	2,5063E+13	25,8	9,86E-07	5,762E-07	1,688E-05	3,12E-07	2,58E-04	12

EST. EFFICIENCY = 89,86 UNCORRECTED COMPUTED EFFICIENCY = 90,01

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=2UM;SIGMAP=2,5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,600E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR. =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART. PATH PARAM. = 5,708E-08 M
INPUT EFF./INCR. = 17,47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1,7918	3,622E+05	3,0874E+05	1,3822E+13	25,8	2,74E-06	7,225E-06	2,117E-04	6,30E-07	2,57E-04	1
1,5814	3,622E+05	2,9922E+05	1,5661E+13	25,8	1,97E-06	5,908E-06	1,731E-04	8,57E-07	2,57E-04	2
1,4187	3,622E+05	2,9153E+05	1,7457E+13	25,8	1,76E-06	4,310E-06	1,263E-04	8,16E-07	2,57E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,580E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR. =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART. PATH PARAM. = 5,708E-08 M
INPUT EFF./INCR. = 17,47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1,3006	3,606E+05	2,8454E+05	1,9125E+13	25,8	1,62E-06	3,214E-06	9,416E-05	7,40E-07	2,57E-04	4
1,2176	3,606E+05	2,8105E+05	2,0430E+13	25,8	1,51E-06	2,479E-06	7,263E-05	6,69E-07	2,57E-04	5
1,1579	3,606E+05	2,7846E+05	2,1483E+13	25,8	1,42E-06	1,948E-06	5,707E-05	6,02E-07	2,57E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1,5250 M

COLLECTION AREA = 1,162E+00 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 4,440E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC

TOTAL CURRENT = 3,000E-04 AMPS
CORONA WIRE LENGTH = 3,812E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART. PATH PARAM. = 5,708E-08 M

DUST WEIGHT = 3.250E-06 KG/SEC LENGTH INCR. =0.25416565 M INPUT EFF./INCR. = 17.47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1113	3.496E+05	2.6940E+05	2.3089E+13	25.8	1.34E-06	1.513E-06	4.432E-05	5.26E-07	2.58E-04	7
1.0814	3.496E+05	2.6806E+05	2.3728E+13	25.8	1.27E-06	1.226E-06	3.591E-05	4.73E-07	2.58E-04	8
1.0596	3.496E+05	2.6709E+05	2.4216E+13	25.8	1.20E-06	1.003E-06	2.938E-05	4.26E-07	2.58E-04	9
1.0437	3.496E+05	2.6637E+05	2.4585E+13	25.8	1.13E-06	8.278E-07	2.425E-05	3.83E-07	2.58E-04	10
1.0321	3.496E+05	2.6584E+05	2.4861E+13	25.8	1.06E-06	6.881E-07	2.016E-05	3.46E-07	2.58E-04	11
1.0236	3.496E+05	2.6584E+05	2.5068E+13	25.8	9.85E-07	5.761E-07	1.688E-05	3.12E-07	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9604	0.9120
2	1.5443	1.5269	1.4641	1.4127	1.3729	1.2639	1.1721	1.1279
3	1.7694	1.7093	1.6124	1.5383	1.4826	1.3345	1.2234	1.1743
4	1.9154	1.8219	1.7020	1.6133	1.5475	1.3752	1.2504	1.1965
5	2.0238	1.9038	1.7669	1.6673	1.5942	1.4044	1.2694	1.2117
6	2.1098	1.9680	1.8175	1.7094	1.6306	1.4271	1.2840	1.2233
7	2.1777	2.0160	1.8537	1.7385	1.6548	1.4402	1.2907	1.2276
8	2.2356	2.0570	1.8848	1.7636	1.6758	1.4517	1.2968	1.2276
9	2.2857	2.0925	1.9119	1.7854	1.6942	1.4620	1.2968	1.2276
10	2.3299	2.1238	1.9358	1.8048	1.7105	1.4712	1.2968	1.2276
11	2.3692	2.1517	1.9571	1.8221	1.7251	1.4796	1.2968	1.2276
12	2.4045	2.1768	1.9763	1.8377	1.7383	1.4872	1.2968	1.2276

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.8853	0.8680	0.8430	0.8205	0.8070
2	1.1004	1.0799	1.0374	0.9818	0.9518
3	1.1456	1.1263	1.0962	1.0642	1.0317
4	1.1652	1.1443	1.1125	1.0809	1.0575
5	1.1784	1.1562	1.1226	1.0898	1.0666
6	1.1882	1.1650	1.1298	1.0959	1.0722
7	1.1914	1.1673	1.1312	1.0965	1.0725
8	1.1914	1.1673	1.1312	1.0965	1.0725
9	1.1914	1.1673	1.1312	1.0965	1.0725
10	1.1914	1.1673	1.1312	1.0965	1.0725
11	1.1914	1.1673	1.1312	1.0965	1.0725
12	1.1914	1.1673	1.1312	1.0965	1.0725

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.33549E-15	0.71389E-15
2	0.19807E-17	0.62387E-17	0.12596E-16	0.20968E-16	0.31312E-16	0.11186E-15	0.40945E-15	0.88290E-15
3	0.22694E-17	0.69842E-17	0.13872E-16	0.22832E-16	0.33813E-16	0.11811E-15	0.42737E-15	0.91921E-15
4	0.24567E-17	0.74443E-17	0.14643E-16	0.23945E-16	0.35293E-16	0.12171E-15	0.43680E-15	0.93653E-15
5	0.25957E-17	0.77791E-17	0.15201E-16	0.24748E-16	0.36358E-16	0.12429E-15	0.44345E-15	0.94846E-15
6	0.27059E-17	0.80412E-17	0.15637E-16	0.25373E-16	0.37187E-16	0.12630E-15	0.44856E-15	0.95751E-15
7	0.27931E-17	0.82375E-17	0.15949E-16	0.25805E-16	0.37740E-16	0.12746E-15	0.45090E-15	0.96092E-15
8	0.28673E-17	0.84048E-17	0.16216E-16	0.26176E-16	0.38218E-16	0.12848E-15	0.45301E-15	0.96092E-15
9	0.29317E-17	0.85501E-17	0.16449E-16	0.26501E-16	0.38637E-16	0.12939E-15	0.45301E-15	0.96092E-15
10	0.29883E-17	0.86780E-17	0.16654E-16	0.26788E-16	0.39009E-16	0.13021E-15	0.45301E-15	0.96092E-15
11	0.30387E-17	0.87920E-17	0.16838E-16	0.27045E-16	0.39343E-16	0.13095E-15	0.45301E-15	0.96092E-15
12	0.30840E-17	0.88946E-17	0.17003E-16	0.27277E-16	0.39644E-16	0.13162E-15	0.45301E-15	0.96092E-15

INCREMENT					
	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.12295E-14	0.18814E-14	0.41044E-14	0.11083E-13	0.27887E-13
2	0.15282E-14	0.23406E-14	0.50511E-14	0.13263E-13	0.32891E-13
3	0.15911E-14	0.24412E-14	0.53376E-14	0.14376E-13	0.35655E-13
4	0.16182E-14	0.24802E-14	0.54166E-14	0.14601E-13	0.36544E-13
5	0.16365E-14	0.25059E-14	0.54658E-14	0.14722E-13	0.36861E-13
6	0.16502E-14	0.25250E-14	0.55012E-14	0.14803E-13	0.37053E-13
7	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13
8	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13
9	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13
10	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13
11	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13
12	0.16546E-14	0.25301E-14	0.55079E-14	0.14812E-13	0.37062E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	1.751	1.867	6.0440	3.8451	88.9412	8.959	11.0588	88.8844	8.938	11.1156
4.000E-07	1.361	4.594	14.7187	9.4191	89.0567	9.002	10.9433	88.9357	8.957	11.0643
6.000E-07	1.239	6.081	16.3798	10.5941	90.7988	9.708	9.2012	90.5975	9.619	9.4025
8.000E-07	1.179	6.580	14.5254	9.5492	92.4596	10.517	7.5404	92.1681	10.363	7.8319
1.000E-06	1.144	6.530	11.9298	8.0224	93.7599	11.288	6.2401	93.3702	11.041	6.6298
2.000E-06	1.072	40.039	31.2996	26.4802	97.3298	14.741	2.6702	96.4309	13.561	3.5691
4.000E-06	1.036	18.907	4.7419	10.9246	99.1433	19.367	0.8567	96.8818	14.110	3.1182
6.000E-06	1.024	6.522	0.3267	5.0154	99.8289	25.921	0.1711	95.8498	12.947	4.1502
8.000E-06	1.018	3.916	0.0318	4.2293	99.9723	33.328	0.0277	94.1711	11.565	5.8289
1.000E-05	1.014	1.699	0.0023	2.4740	99.9954	40.663	0.0046	92.1419	10.350	7.8581
1.500E-05	1.010	2.522	0.0001	5.6594	99.9999	58.091	0.0001	87.8921	8.591	12.1079
2.500E-05	1.006	0.549	0.0000	2.4350	99.9999	93.377	0.0001	76.0627	5.817	23.9373
4.000E-05	1.004	0.194	0.0000	1.3522	99.9999	145.716	0.0001	62.4793	3.989	37.5207

EFFICIENCY = STATED = 90.01 COMPUTED = 90.0096 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 96.5843
MMD OF INLET SIZE DISTRIBUTION = 2.000E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 8.863E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.034E+00
LOG-NORMAL GOODNESS OF FIT = 1.000
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.739

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 94.6034
CORRECTED MMD OF EFFLUENT = 1.894E+00
CORRECTED SIGMAP OF EFFLUENT = 3.533E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 11.88

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.687E+00	5.959E+01	1.624E-01	8.335E-04	1.632E-01	5.350E-02	2.000E-07
4.266E+00	6.496E+01	8.504E-01	9.402E-03	8.598E-01	2.806E-01	4.000E-07
5.056E+00	7.114E+01	1.437E+00	3.142E-02	1.468E+00	6.176E-01	6.000E-07
5.876E+00	7.640E+01	1.706E+00	6.596E-02	1.772E+00	9.685E-01	8.000E-07
6.699E+00	8.073E+01	1.755E+00	1.096E-01	1.864E+00	1.285E+00	1.000E-06
1.076E+01	9.290E+01	9.529E-01	3.20AE-01	1.274E+00	1.817E+01	2.000E-06
1.844E+01	9.893E+01	2.479E-01	6.545E-01	9.024E-01	2.159E+01	4.000E-06
2.592E+01	9.983E+01	3.189E-02	7.418E-01	7.737E-01	1.310E+01	6.000E-06
3.333E+01	9.997E+01	3.38AE-03	7.092E-01	7.126E-01	1.147E+01	8.000E-06
4.066E+01	1.000E+02	3.716E-04	6.388E-01	6.392E-01	6.736E+00	1.000E-05
5.809E+01	1.000E+02	3.854E-06	4.705E-01	4.705E-01	1.542E+01	1.500E-05
9.338E+01	1.000E+02	9.779E-07	2.360E-01	2.360E-01	6.634E+00	2.500E-05
1.457E+02	1.000E+02	3.668E-07	1.362E-01	1.362E-01	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 94.6034 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 2.000E+00 UM INLET SIGMAP = 2.500E+00

OUTLET MMD = 1.894E+00 UM OUTLET SIGMAP = 3.533E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    T.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 14 NDATA = 2

DATA ON CARD NUMBER 2

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=5UM;SIGMAP=2.5

DATA ON CARD NUMBER 3

D50 = 5.0000 UM SIGMAP = 2.5000

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=SUM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2977	3.622E+05	2.8543E+05	1.9085E+13	25.8	7.44E-06	1.281E-05	3.753E-04	4.52E-07	2.58E-04	1
1.1940	3.622E+05	2.8104E+05	2.0741E+13	25.8	4.78E-06	7.221E-06	2.115E-04	4.47E-07	2.58E-04	2
1.1261	3.622E+05	2.7805E+05	2.1993E+13	25.8	3.47E-06	4.233E-06	1.240E-04	3.54E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0830	3.606E+05	2.7511E+05	2.2969E+13	25.8	2.84E-06	2.711E-06	7.941E-05	2.80E-07	2.58E-04	4
1.0556	3.606E+05	2.7386E+05	2.3564E+13	25.8	2.36E-06	1.848E-06	5.413E-05	2.26E-07	2.58E-04	5
1.0377	3.606E+05	2.7303E+05	2.3971E+13	25.8	1.97E-06	1.309E-06	3.834E-05	1.84E-07	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 17.47

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0249	3.496E+05	2.6551E+05	2.5034E+13	25.8	1.83E-06	9.289E-07	2.721E-05	1.48E-07	2.58E-04	7
1.0172	3.496E+05	2.6551E+05	2.5223E+13	25.8	1.73E-06	6.947E-07	2.035E-05	1.23E-07	2.58E-04	8
1.0120	3.496E+05	2.6551E+05	2.5354E+13	25.8	1.65E-06	5.284E-07	1.548E-05	1.03E-07	2.58E-04	9

1,0084	3,496E+05	2,6551E+05	2,5445E+13	25,8	1,58E-06	4,075E-07	1,194E-05	8,71E-08	2,58E-04	10
1,0059	3,496E+05	2,6551E+05	2,5508E+13	25,8	1,52E-06	3,178E-07	9,310E-06	7,40E-08	2,58E-04	11
1,0042	3,496E+05	2,6551E+05	2,5552E+13	25,8	1,47E-06	2,497E-07	7,314E-06	6,29E-08	2,58E-04	12

EST, EFFICIENCY = 90,01 UNCORRECTED COMPUTED EFFICIENCY = 96,82

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=SUM;SIGMAP=2,5

CALCULATION IS IN SECTION NO, = 1 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E+01 M2	APPLIED VOLTAGE = 4,600E+04 VOLTS	TOTAL CURRENT = 1,500E-04 AMPS
WIRE TO PLATE = 1,270E-01 M	CORONA WIRE RADIUS = 1,191E-03 M	CORONA WIRE LENGTH = 1,906E+00 M
CURRENT/M = 7,869E-05 AMP/M	CURRENT DENSITY = 2,581E-04 AMP/M2	DEPOSIT E FIELD = 2,581E+03 VOLT/M
1/2 WIRE TO WIRE = 6,350E-02 M	GAS FLOW RATE = 9,460E-02 M3/SEC	GAS VELOCITY = 9,760E-01 M/SEC
TEMPERATURE = 297,667 K	PRESSURE = 1,000 ATM	VISCOSITY = 1,800E-05 KG/M-SEC
ION MOBILITY = 1,798E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 4,439E+02 M/SEC	PART, PATH PARAM, = 5,708E-08 M
DUST WEIGHT = 3,250E-06 KG/SEC	LENGTH INCR, =0,25416565 M	INPUT EFF,/INCR, = 24,98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,4258	3,622E+05	2,9187E+05	1,7370E+13	25,8	7,41E-06	1,284E-05	3,760E-04	4,52E-07	2,58E-04	1
1,2516	3,622E+05	2,8351E+05	1,9787E+13	25,8	4,80E-06	7,248E-06	2,123E-04	4,46E-07	2,58E-04	2
1,1484	3,622E+05	2,7904E+05	2,1566E+13	25,8	3,48E-06	4,227E-06	1,238E-04	3,52E-07	2,58E-04	3

CALCULATION IS IN SECTION NO, = 2 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E+01 M2	APPLIED VOLTAGE = 4,580E+04 VOLTS	TOTAL CURRENT = 1,500E-04 AMPS
WIRE TO PLATE = 1,270E-01 M	CORONA WIRE RADIUS = 1,191E-03 M	CORONA WIRE LENGTH = 1,906E+00 M
CURRENT/M = 7,869E-05 AMP/M	CURRENT DENSITY = 2,581E-04 AMP/M2	DEPOSIT E FIELD = 2,581E+03 VOLT/M
1/2 WIRE TO WIRE = 6,350E-02 M	GAS FLOW RATE = 9,460E-02 M3/SEC	GAS VELOCITY = 9,760E-01 M/SEC
TEMPERATURE = 297,667 K	PRESSURE = 1,000 ATM	VISCOSITY = 1,800E-05 KG/M-SEC
ION MOBILITY = 1,798E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 4,439E+02 M/SEC	PART, PATH PARAM, = 5,708E-08 M
DUST WEIGHT = 3,250E-06 KG/SEC	LENGTH INCR, =0,25416565 M	INPUT EFF,/INCR, = 24,98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0887	3,606E+05	2,7537E+05	2,2847E+13	25,8	2,85E-06	2,699E-06	7,907E-05	2,78E-07	2,58E-04	4
1,0541	3,606E+05	2,7379E+05	2,3598E+13	25,8	2,36E-06	1,838E-06	5,384E-05	2,25E-07	2,58E-04	5
1,0333	3,606E+05	2,7283E+05	2,4072E+13	25,8	1,97E-06	1,301E-06	3,812E-05	1,83E-07	2,58E-04	6

CALCULATION IS IN SECTION NO, = 3 AND THE SECTION LENGTH IS = 1,5250 M

COLLECTION AREA = 1,162E+00 M2	APPLIED VOLTAGE = 4,440E+04 VOLTS	TOTAL CURRENT = 3,000E-04 AMPS
WIRE TO PLATE = 1,270E-01 M	CORONA WIRE RADIUS = 1,191E-03 M	CORONA WIRE LENGTH = 3,812E+00 M
CURRENT/M = 7,869E-05 AMP/M	CURRENT DENSITY = 2,581E-04 AMP/M2	DEPOSIT E FIELD = 2,581E+03 VOLT/M
1/2 WIRE TO WIRE = 6,350E-02 M	GAS FLOW RATE = 9,460E-02 M3/SEC	GAS VELOCITY = 9,760E-01 M/SEC
TEMPERATURE = 297,667 K	PRESSURE = 1,000 ATM	VISCOSITY = 1,800E-05 KG/M-SEC
ION MOBILITY = 1,798E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 4,439E+02 M/SEC	PART, PATH PARAM, = 5,708E-08 M
DUST WEIGHT = 3,250E-06 KG/SEC	LENGTH INCR, =0,25416565 M	INPUT EFF,/INCR, = 24,98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,

1.0201	3.496E+05	2.6529E+05	2.5154E+13	25.8	1.83E-06	9.239E-07	2.707E-05	1.47E-07	2.58E-04	7
1.0126	3.496E+05	2.6529E+05	2.5339E+13	25.8	1.73E-06	6.912E-07	2.025E-05	1.22E-07	2.58E-04	8
1.0080	3.496E+05	2.6529E+05	2.5455E+13	25.8	1.65E-06	5.259E-07	1.541E-05	1.03E-07	2.58E-04	9
1.0051	3.496E+05	2.6529E+05	2.5529E+13	25.8	1.58E-06	4.056E-07	1.188E-05	8.68E-08	2.58E-04	10
1.0032	3.496E+05	2.6529E+05	2.5576E+13	25.8	1.52E-06	3.165E-07	9.272E-06	7.37E-08	2.58E-04	11
1.0021	3.496E+05	2.6529E+05	2.5605E+13	25.8	1.47E-06	2.493E-07	7.304E-06	6.29E-08	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATP FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9942
2	1.6115	1.5826	1.5098	1.4516	1.4070	1.2860	1.1976	1.1543
3	1.8405	1.7648	1.6569	1.5757	1.5152	1.3553	1.2416	1.1908
4	1.9834	1.8736	1.7431	1.6477	1.5773	1.3941	1.2655	1.2095
5	2.0868	1.9511	1.8043	1.6985	1.6212	1.4214	1.2824	1.2226
6	2.1674	2.0108	1.8512	1.7376	1.6549	1.4424	1.2954	1.2326
7	2.2302	2.0549	1.8844	1.7641	1.6770	1.4543	1.3012	1.2364
8	2.2833	2.0923	1.9127	1.7869	1.6960	1.4647	1.3012	1.2364
9	2.3292	2.1247	1.9373	1.8067	1.7126	1.4739	1.3012	1.2364
10	2.3696	2.1532	1.9590	1.8242	1.7274	1.4822	1.3012	1.2364
11	2.4055	2.1786	1.9784	1.8399	1.7406	1.4897	1.3012	1.2364
12	2.4380	2.2015	1.9959	1.8541	1.7526	1.4965	1.3012	1.2364

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.9575	0.9344	0.9014	0.8726	0.8557
2	1.1269	1.1081	1.0770	1.0332	0.9923
3	1.1605	1.1402	1.1093	1.0784	1.0550
4	1.1766	1.1567	1.1216	1.0892	1.0663
5	1.1878	1.1647	1.1297	1.0960	1.0724
6	1.1963	1.1722	1.1358	1.1008	1.0765
7	1.1989	1.1741	1.1369	1.1008	1.0765
8	1.1989	1.1741	1.1369	1.1008	1.0765
9	1.1989	1.1741	1.1369	1.1008	1.0765
10	1.1989	1.1741	1.1369	1.1008	1.0765
11	1.1989	1.1741	1.1369	1.1008	1.0765
12	1.1989	1.1741	1.1369	1.1008	1.0765

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.36192E-15	0.77823E-15
2	0.20669E-17	0.64666E-17	0.12989E-16	0.21545E-16	0.32088E-16	0.11381E-15	0.41835E-15	0.90353E-15
3	0.23605E-17	0.72110E-17	0.14255E-16	0.23388E-16	0.34555E-16	0.11995E-15	0.43374E-15	0.93208E-15
4	0.25438E-17	0.76555E-17	0.14997E-16	0.24456E-16	0.35973E-16	0.12338E-15	0.44208E-15	0.94672E-15
5	0.26765E-17	0.79722E-17	0.15523E-16	0.25211E-16	0.36974E-16	0.12580E-15	0.44799E-15	0.95701E-15
6	0.27799E-17	0.82163E-17	0.15927E-16	0.25791E-16	0.37742E-16	0.12765E-15	0.45252E-15	0.96486E-15
7	0.28604E-17	0.83964E-17	0.16213E-16	0.26185E-16	0.38246E-16	0.12871E-15	0.45456E-15	0.96776E-15
8	0.29285E-17	0.85492E-17	0.16456E-16	0.26522E-16	0.38679E-16	0.12963E-15	0.45456E-15	0.96776E-15
9	0.29874E-17	0.86814E-17	0.16667E-16	0.26816E-16	0.39058E-16	0.13044E-15	0.45456E-15	0.96776E-15
10	0.30392E-17	0.87979E-17	0.16854E-16	0.27076E-16	0.39395E-16	0.13118E-15	0.45456E-15	0.96776E-15
11	0.30853E-17	0.89018E-17	0.17021E-16	0.27310E-16	0.39696E-16	0.13184E-15	0.45456E-15	0.96776E-15
12	0.31269E-17	0.89955E-17	0.17171E-16	0.27520E-16	0.39970E-16	0.13245E-15	0.45456E-15	0.96776E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.13298E-14	0.20251E-14	0.43889E-14	0.11787E-13	0.29571E-13
2	0.15650E-14	0.24017E-14	0.52439E-14	0.13956E-13	0.34292E-13
3	0.16117E-14	0.24714E-14	0.54011E-14	0.14568E-13	0.36459E-13
4	0.16341E-14	0.25028E-14	0.54609E-14	0.14714E-13	0.36849E-13
5	0.16496E-14	0.25243E-14	0.55007E-14	0.14805E-13	0.37060E-13
6	0.16614E-14	0.25406E-14	0.55302E-14	0.14870E-13	0.37203E-13
7	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13
8	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13
9	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13
10	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13
11	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13
12	0.16650E-14	0.25448E-14	0.55356E-14	0.14870E-13	0.37203E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	1.751	0.106	0.9240	0.4714	89.0329	8.993	10.9671	88.3452	8.746	11.6548
4.000E-07	1.361	0.492	4.2921	2.2068	89.0293	8.992	10.9707	88.2525	8.713	11.7475
6.000E-07	1.239	0.996	7.3651	3.8569	90.7056	9.667	9.2944	89.8615	9.313	10.1385
8.000E-07	1.179	1.469	8.9598	4.8049	92.3351	10.451	7.6649	91.4378	10.000	8.5622
1.000E-06	1.144	1.858	9.4280	5.1941	93.6217	11.198	6.3783	92.6803	10.638	7.3197
2.000E-06	1.072	22.687	50.3662	33.6263	97.2094	14.562	2.7906	96.1191	13.220	3.8809
4.000E-06	1.036	23.253	16.5537	19.1700	99.1051	19.190	0.8949	97.8413	15.607	2.1587
6.000E-06	1.024	12.877	1.8357	7.6927	99.8208	25.733	0.1792	98.4358	16.917	1.5642
8.000E-06	1.018	10.590	0.2503	6.0825	99.9703	33.044	0.0297	98.4961	17.077	1.5039
1.000E-05	1.014	5.918	0.0236	3.5137	99.9950	40.292	0.0050	98.4455	16.943	1.5545
1.500E-05	1.010	12.574	0.0010	8.0167	99.9999	58.261	0.0001	98.3306	16.653	1.6694
2.500E-05	1.006	4.835	0.0004	3.4491	99.9999	93.547	0.0001	98.1323	16.196	1.8677
4.000E-05	1.004	2.344	0.0002	1.9154	99.9999	145.964	0.0001	97.8600	15.642	2.1400

EFFICIENCY = STATED = 96.82 COMPUTED = 96.8317 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.7430
MMD OF INLET SIZE DISTRIBUTION = 5.000E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.476E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.930E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 17.807

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 97.3816
CORRECTED MMD OF EFFLUENT = 3.373E+00
CORRECTED SIGMAP OF EFFLUENT = 2.778E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
CORRECTED PRECIPITATION RATE PARAMETER = 14.82

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.701E+00	5.973E+01	9.135E-03	5.728E-04	9.708E-03	5.350E-02	2.000E-07
4.262E+00	6.491E+01	9.126E-02	6.461E-03	9.772E-02	2.806E-01	4.000E-07
5.035E+00	7.099E+01	2.377E-01	2.159E-02	2.593E-01	6.176E-01	6.000E-07
5.838E+00	7.619E+01	3.872E-01	4.533E-02	4.326E-01	9.685E-01	8.000E-07
6.646E+00	8.047E+01	5.103E-01	7.531E-02	5.856E-01	1.285E+00	1.000E-06
1.063E+01	9.266E+01	5.643E-01	2.205E-01	7.848E-01	1.817E+01	2.000E-06
1.828E+01	9.888E+01	3.185E-01	4.498E-01	7.683E-01	2.159E+01	4.000E-06
2.573E+01	9.982E+01	6.596E-02	5.098E-01	5.758E-01	1.310E+01	6.000E-06
3.304E+01	9.997E+01	9.825E-03	4.874E-01	4.972E-01	1.147E+01	8.000E-06
4.029E+01	9.999E+01	1.418E-03	4.390E-01	4.404E-01	6.736E+00	1.000E-05
5.826E+01	1.000E+02	1.958E-05	3.233E-01	3.234E-01	1.542E+01	1.500E-05
9.355E+01	1.000E+02	8.614E-06	1.622E-01	1.622E-01	6.634E+00	2.500E-05
1.460E+02	1.000E+02	4.337E-06	9.357E-02	9.358E-02	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 97.3816 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.513E+04 V
AVG. CURRENT DENSITY = 25.81 NA/CM**2
RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 5.000E+00 UM INLET SIGMAP = 2.500E+00
OUTLET MMD = 3.373E+00 UM OUTLET SIGMAP = 2.778E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.F.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*        REVISION I,JAN. 1, 1978     *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 14 NDATA = 2

DATA ON CARD NUMBER 2

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=2.5

DATA ON CARD NUMBER 3

D50 = 10.0000 UM SIGMAP = 2.5000

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2120	3.622E+05	2.8182E+05	2.0434E+13	25.8	1.28E-05	1.856E-05	5.437E-04	3.52E-07	2.58E-04	1
1.1057	3.622E+05	2.7713E+05	2.2399E+13	25.8	7.98E-06	7.147E-06	2.094E-04	2.56E-07	2.58E-04	2
1.0551	3.622E+05	2.7483E+05	2.3473E+13	25.8	5.67E-06	3.308E-06	9.691E-05	1.69E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0299	3.606E+05	2.7268E+05	2.4151E+13	25.8	4.25E-06	1.809E-06	5.298E-05	1.18E-07	2.58E-04	4
1.0168	3.606E+05	2.7208E+05	2.4462E+13	25.8	3.51E-06	1.094E-06	3.206E-05	8.56E-08	2.58E-04	5
1.0097	3.606E+05	2.7208E+05	2.4636E+13	25.8	3.05E-06	7.044E-07	2.063E-05	6.41E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.98

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0055	3.496E+05	2.6462E+05	2.5519E+13	25.8	2.68E-06	4.606E-07	1.349E-05	4.75E-08	2.58E-04	7
1.0033	3.496E+05	2.6462E+05	2.5575E+13	25.8	2.34E-06	3.209E-07	9.401E-06	3.69E-08	2.58E-04	8
1.0020	3.496E+05	2.6462E+05	2.5609E+13	25.8	2.01E-06	2.293E-07	6.718E-06	2.91E-08	2.58E-04	9

1.0012	3.496E+05	2.6462E+05	2.5628E+13	25.8	1.89E-06	1.672E-07	4.899E-06	2.32E-08	2.58E-04	10
1.0007	3.496E+05	2.6462E+05	2.5640E+13	25.8	1.79E-06	1.240E-07	3.632E-06	1.87E-08	2.58E-04	11
1.0004	3.496E+05	2.6462E+05	2.5647E+13	25.8	1.72E-06	9.301E-08	2.725E-06	1.51E-08	2.58E-04	12

EST. EFFICIENCY = 96.82 UNCORRECTED COMPUTED EFFICIENCY = 99.03

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2718	3.622E+05	2.8435E+05	1.9474E+13	25.8	1.28E-05	1.855E-05	5.434E-04	3.51E-07	2.58E-04	1
1.1226	3.622E+05	2.7790E+05	2.2061E+13	25.8	7.99E-06	7.166E-06	2.099E-04	2.56E-07	2.58E-04	2
1.0579	3.622E+05	2.7495E+05	2.3411E+13	25.8	5.69E-06	3.308E-06	9.692E-05	1.69E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0285	3.606E+05	2.7261E+05	2.4185E+13	25.8	4.26E-06	1.806E-06	5.292E-05	1.17E-07	2.58E-04	4
1.0145	3.606E+05	2.7197E+05	2.4518E+13	25.8	3.52E-06	1.092E-06	3.200E-05	8.54E-08	2.58E-04	5
1.0076	3.606E+05	2.7197E+05	2.4687E+13	25.8	3.05E-06	7.030E-07	2.060E-05	6.40E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1,0039	3,496E+05	2,6455E+05	2,5559E+13	25,8	2,68E-06	4,597E-07	1,347E-05	4,74E-08	2,58E-04	7
1,0021	3,496E+05	2,6455E+05	2,5605E+13	25,8	2,34E-06	3,203E-07	9,383E-06	3,68E-08	2,58E-04	8
1,0011	3,496E+05	2,6455E+05	2,5629E+13	25,8	2,01E-06	2,289E-07	6,705E-06	2,90E-08	2,58E-04	9
1,0006	3,496E+05	2,6455E+05	2,5643E+13	25,8	1,89E-06	1,669E-07	4,890E-06	2,31E-08	2,58E-04	10
1,0003	3,496E+05	2,6455E+05	2,5650E+13	25,8	1,79E-06	1,238E-07	3,626E-06	1,86E-08	2,58E-04	11
1,0002	3,496E+05	2,6455E+05	2,5654E+13	25,8	1,72E-06	9,286E-08	2,720E-06	1,51E-08	2,58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.6438	1.6090	1.5313	1.4698	1.4229	1.2962	1.2041	1.1642
3	1.8713	1.7886	1.6759	1.5917	1.5290	1.3641	1.2472	1.1973
4	2.0104	1.8941	1.7594	1.6612	1.5891	1.4015	1.2702	1.2145
5	2.1103	1.9686	1.8181	1.7101	1.6312	1.4277	1.2864	1.2267
6	2.1877	2.0259	1.8631	1.7475	1.6634	1.4477	1.2988	1.2361
7	2.2479	2.0681	1.8949	1.7728	1.6845	1.4591	1.3043	1.2395
8	2.2990	2.1039	1.9219	1.7946	1.7027	1.4690	1.3043	1.2395
9	2.3431	2.1350	1.9455	1.8136	1.7186	1.4778	1.3043	1.2395
10	2.3821	2.1625	1.9664	1.8304	1.7328	1.4857	1.3043	1.2395
11	2.4169	2.1870	1.9851	1.8456	1.7455	1.4929	1.3043	1.2395
12	2.4483	2.2092	2.0020	1.8593	1.7571	1.4929	1.3043	1.2395

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.9965	0.9691	0.9308	0.8978	0.8788
2	1.1367	1.1177	1.0876	1.0525	1.0118
3	1.1664	1.1457	1.1141	1.0831	1.0604
4	1.1811	1.1588	1.1250	1.0923	1.0692
5	1.1914	1.1679	1.1324	1.0982	1.0744
6	1.1993	1.1748	1.1380	1.1026	1.0744
7	1.2017	1.1766	1.1380	1.1026	1.0744
8	1.2017	1.1766	1.1380	1.1026	1.0744
9	1.2017	1.1766	1.1380	1.1026	1.0744
10	1.2017	1.1766	1.1380	1.1026	1.0744
11	1.2017	1.1766	1.1380	1.1026	1.0744
12	1.2017	1.1766	1.1380	1.1026	1.0744

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.36192E-15	0.81097E-15
2	0.21083E-17	0.65744E-17	0.13174E-16	0.21816E-16	0.32452E-16	0.11472E-15	0.42064E-15	0.91132E-15
3	0.24000E-17	0.73083E-17	0.14419E-16	0.23625E-16	0.34871E-16	0.12073E-15	0.43569E-15	0.93717E-15
4	0.25785E-17	0.77391E-17	0.15137E-16	0.24857E-16	0.36241E-16	0.12404E-15	0.44372E-15	0.95066E-15
5	0.27066E-17	0.80437E-17	0.15642E-16	0.25382E-16	0.37201E-16	0.12636E-15	0.44937E-15	0.96021E-15
6	0.28059E-17	0.82779E-17	0.16029E-16	0.25937E-16	0.37936E-16	0.12813E-15	0.45371E-15	0.96753E-15
7	0.28832E-17	0.84503E-17	0.16302E-16	0.26314E-16	0.38418E-16	0.12913E-15	0.45564E-15	0.97023E-15
8	0.29486E-17	0.85967E-17	0.16535E-16	0.26637E-16	0.38832E-16	0.13001E-15	0.45564E-15	0.97023E-15
9	0.30053E-17	0.87238E-17	0.16738E-16	0.26919E-16	0.39196E-16	0.13079E-15	0.45564E-15	0.97023E-15
10	0.30552E-17	0.88359E-17	0.16918E-16	0.27169E-16	0.39518E-16	0.13149E-15	0.45564E-15	0.97023E-15
11	0.30998E-17	0.89362E-17	0.17078E-16	0.27393E-16	0.39809E-16	0.13213E-15	0.45564E-15	0.97023E-15
12	0.31402E-17	0.90269E-17	0.17224E-16	0.27597E-16	0.40073E-16	0.13213E-15	0.45564E-15	0.97023E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.13639E-14	0.21004E-14	0.45319E-14	0.12129E-13	0.30370E-13
2	0.15787E-14	0.24225E-14	0.52957E-14	0.14218E-13	0.34967E-13
3	0.16199E-14	0.24831E-14	0.54248E-14	0.14631E-13	0.36646E-13
4	0.16403E-14	0.25115E-14	0.54778E-14	0.14755E-13	0.36951E-13
5	0.16546E-14	0.25313E-14	0.55139E-14	0.14835E-13	0.37131E-13
6	0.16655E-14	0.25463E-14	0.55409E-14	0.14894E-13	0.37131E-13
7	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13
8	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13
9	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13
10	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13
11	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13
12	0.16689E-14	0.25502E-14	0.55409E-14	0.14894E-13	0.37131E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	1.751	0.006	0.1592	0.0887	89.0778	9.010	10.9222	81.7199	6.914	18.2801
4.000E-07	1.361	0.047	1.1721	0.5773	89.0315	8.993	10.9685	83.7682	7.398	16.2318
6.000E-07	1.239	0.131	2.7599	1.3307	90.6827	9.656	9.3173	86.5034	8.149	13.4966
8.000E-07	1.179	0.244	4.2406	2.0576	92.2992	10.432	7.7008	88.7741	8.898	11.2259
1.000E-06	1.144	0.370	5.3621	2.6420	93.5795	11.172	6.4205	90.4959	9.576	9.5041
2.000E-06	1.072	8.035	51.3510	29.2148	97.1654	14.498	2.8346	95.1550	12.317	4.8450
4.000E-06	1.036	14.286	29.5135	24.2250	99.0836	19.093	0.9164	97.7402	15.420	2.2598
6.000E-06	1.024	11.154	4.5501	10.2547	99.8191	25.693	0.1809	98.7748	17.911	1.2252
8.000E-06	1.018	11.626	0.7907	7.9138	99.9698	32.982	0.0302	99.0929	19.134	0.9071
1.000E-05	1.014	7.845	0.0906	4.5243	99.9949	40.198	0.0051	99.2315	19.809	0.7685
1.500E-05	1.010	22.251	0.0050	10.2875	99.9999	58.155	0.0001	99.3839	20.708	0.6161
2.500E-05	1.006	13.091	0.0029	4.4258	99.9999	93.439	0.0001	99.5495	21.982	0.4505
4.000E-05	1.004	10.913	0.0025	2.4578	99.9999	145.277	0.0001	99.6999	23.635	0.3001

EFFICIENCY = STATED = 99.03 COMPUTED = 99.0276 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.5564
MMD OF INLET SIZE DISTRIBUTION = 1.000E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 2.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.075E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.883E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 22.045

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 98.6674
CORRECTED MMD OF EFFLUENT = 4.542E+00
CORRECTED SIGMAP OF EFFLUENT = 2.489E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 17.57

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.70E+00	5.98E+01	5.553E-04	3.741E-04	9.294E-04	5.35E-02	2.000E-07
4.26E+00	6.49E+01	8.794E-03	4.220E-03	1.301E-02	2.80E-01	4.000E-07
5.02E+00	7.09E+01	3.144E-02	1.410E-02	4.554E-02	6.17E-01	6.000E-07
5.82E+00	7.61E+01	6.467E-02	2.960E-02	9.428E-02	9.68E-01	8.000E-07
6.63E+00	8.04E+01	1.024E-01	4.918E-02	1.516E-01	1.28E+00	1.000E-06
1.05E+01	9.25E+01	2.030E-01	1.440E-01	3.470E-01	1.81E+01	2.000E-06
1.81E+01	9.88E+01	2.004E-01	2.937E-01	4.941E-01	2.15E+01	4.000E-06
2.56E+01	9.98E+01	5.769E-02	3.329E-01	3.906E-01	1.31E+01	6.000E-06
3.29E+01	9.99E+01	1.095E-02	3.183E-01	3.293E-01	1.14E+01	8.000E-06
4.02E+01	9.99E+01	1.923E-03	2.867E-01	2.886E-01	6.73E+00	1.000E-05
5.81E+01	1.00E+02	3.400E-05	2.112E-01	2.112E-01	1.54E+01	1.500E-05
9.34E+01	1.00E+02	2.332E-05	1.059E-01	1.060E-01	6.63E+00	2.500E-05
1.45E+02	1.00E+02	2.058E-05	6.111E-02	6.113E-02	3.68E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 98.6674 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.000E+01 UM INLET SIGMAP = 2.500E+00

OUTLET MMD = 4.542E+00 UM OUTLET SIGMAP = 2.489E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*     I.E.R.L.-R.T.P. AND SO.R.I.    *
*                                    *
*        REVISION I,JAN. 1, 1978     *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 14   NDATA =  2

DATA ON CARD NUMBER   2

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=15UM;SIGMAP=2.5

DATA ON CARD NUMBER   3

D50 =  15.0000 UM  SIGMAP =   2.5000
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=15UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1821	3.622E+05	2.8052E+05	2.0950E+13	25.8	1.68E-05	2.202E-05	6.451E-04	2.98E-07	2.58E-04	1
1.0705	3.622E+05	2.7554E+05	2.3134E+13	25.8	1.06E-05	6.517E-06	1.909E-04	1.74E-07	2.58E-04	2
1.0303	3.622E+05	2.7363E+05	2.4038E+13	25.8	7.11E-06	2.549E-06	7.466E-05	1.01E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0139	3.606E+05	2.7194E+05	2.4532E+13	25.8	5.44E-06	1.251E-06	3.665E-05	6.45E-08	2.58E-04	4
1.0067	3.606E+05	2.7194E+05	2.4708E+13	25.8	4.31E-06	6.996E-07	2.050E-05	4.40E-08	2.58E-04	5
1.0033	3.606E+05	2.7194E+05	2.4791E+13	25.8	3.62E-06	4.222E-07	1.237E-05	3.12E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 32.02

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0016	3.496E+05	2.6445E+05	2.5616E+13	25.8	3.20E-06	2.619E-07	7.673E-06	2.20E-08	2.58E-04	7
1.0009	3.496E+05	2.6445E+05	2.5637E+13	25.8	2.87E-06	1.746E-07	5.114E-06	1.64E-08	2.58E-04	8
1.0005	3.496E+05	2.6445E+05	2.5647E+13	25.8	2.56E-06	1.200E-07	3.515E-06	1.25E-08	2.58E-04	9

1,0002	3,496E+05	2,6445E+05	2,5652E+13	25,8	2,27E-06	8,451E-08	2,476E-06	9,62E-09	2,58E-04	10
1,0001	3,496E+05	2,6445E+05	2,5655E+13	25,8	1,99E-06	6,073E-08	1,779E-06	7,51E-09	2,58E-04	11
1,0001	3,496E+05	2,6445E+05	2,5657E+13	25,8	1,89E-06	4,430E-08	1,298E-06	5,90E-09	2,58E-04	12

EST, EFFICIENCY = 99,03 UNCORRECTED COMPUTED EFFICIENCY = 99,58

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=15UM;SIGMAP=2,5

CALCULATION IS IN SECTION NO, = 1 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,600E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 36,64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,2084	3,622E+05	2,8165E+05	2,0495E+13	25,8	1,68E-05	2,201E-05	6,448E-04	2,97E-07	2,58E-04	1
1,0752	3,622E+05	2,7575E+05	2,3034E+13	25,8	1,06E-05	6,527E-06	1,912E-04	1,74E-07	2,58E-04	2
1,0301	3,622E+05	2,7362E+05	2,4043E+13	25,8	7,12E-06	2,550E-06	7,471E-05	1,01E-07	2,58E-04	3

CALCULATION IS IN SECTION NO, = 2 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,580E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 36,64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0129	3,606E+05	2,7190E+05	2,4557E+13	25,8	5,45E-06	1,251E-06	3,665E-05	6,45E-08	2,58E-04	4
1,0058	3,606E+05	2,7190E+05	2,4730E+13	25,8	4,31E-06	6,996E-07	2,049E-05	4,40E-08	2,58E-04	5
1,0027	3,606E+05	2,7190E+05	2,4807E+13	25,8	3,62E-06	4,221E-07	1,237E-05	3,12E-08	2,58E-04	6

CALCULATION IS IN SECTION NO, = 3 AND THE SECTION LENGTH IS = 1,5250 M

COLLECTION AREA = 1,162E+00 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,440E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 3,000E-04 AMPS
CORONA WIRE LENGTH = 3,812E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 36,64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,

1.0012	3.496E+05	2.6443E+05	2.5627E+13	25.8	3.21E-06	2.618E-07	7.670E-06	2.20E-08	2.58E-04	7
1.0006	3.496E+05	2.6443E+05	2.5643E+13	25.8	2.87E-06	1.745E-07	5.111E-06	1.64E-08	2.58E-04	8
1.0003	3.496E+05	2.6443E+05	2.5651E+13	25.8	2.56E-06	1.199E-07	3.513E-06	1.25E-08	2.58E-04	9
1.0001	3.496E+05	2.6443E+05	2.5655E+13	25.8	2.27E-06	8.445E-08	2.474E-06	9.61E-09	2.58E-04	10
1.0001	3.496E+05	2.6443E+05	2.5657E+13	25.8	1.99E-06	6.069E-08	1.778E-06	7.51E-09	2.58E-04	11
1.0000	3.496E+05	2.6443E+05	2.5658E+13	25.8	1.89E-06	4.427E-08	1.297E-06	5.89E-09	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.6568	1.6195	1.5399	1.4770	1.4293	1.3003	1.2067	1.1662
3	1.8826	1.7973	1.6829	1.5975	1.5341	1.3673	1.2492	1.1988
4	2.0197	1.9011	1.7649	1.6659	1.5931	1.4040	1.2718	1.2157
5	2.1179	1.9743	1.8226	1.7138	1.6345	1.4298	1.2877	1.2277
6	2.1942	2.0307	1.8669	1.7506	1.6661	1.4495	1.2999	1.2369
7	2.2535	2.0722	1.8981	1.7756	1.6869	1.4606	1.3053	1.2403
8	2.3038	2.1075	1.9248	1.7970	1.7048	1.4703	1.3053	1.2403
9	2.3474	2.1382	1.9480	1.8157	1.7205	1.4790	1.3053	1.2403
10	2.3859	2.1653	1.9686	1.8323	1.7345	1.4868	1.3053	1.2403
11	2.4203	2.1896	1.9871	1.8473	1.7470	1.4939	1.3053	1.2403
12	2.4514	2.2115	2.0038	1.8608	1.7585	1.4939	1.3053	1.2403

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	1.0148	0.9852	0.9441	0.9090	0.8889
2	1.1406	1.1215	1.0914	1.0580	1.0201
3	1.1687	1.1478	1.1159	1.0847	1.0622
4	1.1828	1.1603	1.1263	1.0934	1.0703
5	1.1927	1.1691	1.1334	1.0990	1.0752
6	1.2003	1.1758	1.1387	1.1032	1.0752
7	1.2027	1.1775	1.1387	1.1032	1.0752
8	1.2027	1.1775	1.1387	1.1032	1.0752
9	1.2027	1.1775	1.1387	1.1032	1.0752
10	1.2027	1.1775	1.1387	1.1032	1.0752
11	1.2027	1.1775	1.1387	1.1032	1.0752
12	1.2027	1.1775	1.1387	1.1032	1.0752

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.36192E-15	0.81097E-15
2	0.21250E-17	0.66175E-17	0.13248E-16	0.21924E-16	0.32596E-16	0.11508E-15	0.42155E-15	0.91288E-15
3	0.24145E-17	0.73438E-17	0.14478E-16	0.23711E-16	0.34987E-16	0.12101E-15	0.43640E-15	0.93838E-15
4	0.25905E-17	0.77678E-17	0.15185E-16	0.24726E-16	0.36333E-16	0.12426E-15	0.44428E-15	0.95163E-15
5	0.27164E-17	0.80671E-17	0.15681E-16	0.25438E-16	0.37276E-16	0.12654E-15	0.44983E-15	0.96099E-15
6	0.28142E-17	0.82974E-17	0.16062E-16	0.25984E-16	0.37998E-16	0.12828E-15	0.45408E-15	0.96818E-15
7	0.28903E-17	0.84670E-17	0.16330E-16	0.26354E-16	0.38472E-16	0.12927E-15	0.45598E-15	0.97083E-15
8	0.29548E-17	0.86113E-17	0.16560E-16	0.26672E-16	0.38880E-16	0.13013E-15	0.45598E-15	0.97083E-15
9	0.30107E-17	0.87367E-17	0.16760E-16	0.26950E-16	0.39238E-16	0.13090E-15	0.45598E-15	0.97083E-15
10	0.30601E-17	0.88474E-17	0.16937E-16	0.27197E-16	0.39556E-16	0.13159E-15	0.45598E-15	0.97083E-15
11	0.31042E-17	0.89466E-17	0.17096E-16	0.27419E-16	0.39843E-16	0.13222E-15	0.45598E-15	0.97083E-15
12	0.31441E-17	0.90364E-17	0.17240E-16	0.27620E-16	0.40104E-16	0.13222E-15	0.45598E-15	0.97083E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.14094E-14	0.21354E-14	0.45967E-14	0.12280E-13	0.30719E-13
2	0.15840E-14	0.24307E-14	0.53139E-14	0.14291E-13	0.35252E-13
3	0.16231E-14	0.24876E-14	0.54335E-14	0.14653E-13	0.36208E-13
4	0.16426E-14	0.25148E-14	0.54839E-14	0.14770E-13	0.36987E-13
5	0.16564E-14	0.25338E-14	0.55185E-14	0.14846E-13	0.37156E-13
6	0.16670E-14	0.25483E-14	0.55446E-14	0.14903E-13	0.37156E-13
7	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13
8	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13
9	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13
10	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13
11	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13
12	0.16703E-14	0.25521E-14	0.55446E-14	0.14903E-13	0.37156E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	1.751	0.001	0.0513	0.0530	89.1042	9.020	10.8958	53.8820	3.149	46.1180
4.000E-07	1.361	0.009	0.4904	0.3318	89.0435	8.997	10.9565	69.6291	4.849	30.3709
6.000E-07	1.239	0.031	1.3845	0.8049	90.6851	9.658	9.3149	77.8166	6.127	22.1834
8.000E-07	1.179	0.066	2.4341	1.3263	92.2962	10.430	7.7038	82.8041	7.163	17.1959
1.000E-06	1.144	0.111	3.4233	1.8069	93.5733	11.168	6.4267	86.1038	8.030	13.8962
2.000E-06	1.072	3.427	46.8806	25.1794	97.1563	14.485	2.8437	93.7432	11.277	6.2568
4.000E-06	1.036	8.307	36.8367	25.3098	99.0781	19.069	0.9219	97.4053	14.858	2.5947
6.000E-06	1.024	7.884	6.9268	11.5941	99.8173	25.655	0.1827	98.7476	17.822	1.2524
8.000E-06	1.018	9.436	1.3666	9.0023	99.9699	32.990	0.0301	99.1875	19.582	0.8125
1.000E-05	1.014	7.102	0.1750	5.1350	99.9949	40.196	0.0051	99.3842	20.710	0.6158
1.500E-05	1.010	24.025	0.0117	11.6570	99.9999	58.168	0.0001	99.5868	22.333	0.4132
2.500E-05	1.006	18.086	0.0088	5.0147	99.9999	93.450	0.0001	99.7639	24.610	0.2361
4.000E-05	1.004	21.515	0.0103	2.7848	99.9999	145.308	0.0001	99.8898	27.710	0.1102

EFFICIENCY = STATED = 99.58 COMPUTED = 99.5816 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7921
MMD OF INLET SIZE DISTRIBUTION = 1.500E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 2.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.307E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.796E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 25.129

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.1483
CORRECTED MMD OF EFFLUENT = 5.089E+00
CORRECTED SIGMAP OF EFFLUENT = 2.423E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 19.39

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.712E+00	5.984E+01	8.380E-05	2.709E-04	3.547E-04	5.350E-02	2.000E-07
4.264E+00	6.494E+01	1.724E-03	3.056E-03	4.780E-03	2.806E-01	4.000E-07
5.030E+00	7.095E+01	7.391E-03	1.021E-02	1.760E-02	6.176E-01	6.000E-07
5.827E+00	7.612F+01	1.740E-02	2.144E-02	3.884E-02	9.685E-01	8.000E-07
6.628E+00	8.039E+01	3.064E-02	3.562F-02	6.626E-02	1.285E+00	1.000E-06
1.057E+01	9.256E+01	8.687E-02	1.043E-01	1.911E-01	1.817E+01	2.000E-06
1.816E+01	9.885E+01	1.172E-01	2.127E-01	3.299E-01	2.159E+01	4.000E-06
2.566E+01	9.982E+01	4.116E-02	2.411E-01	2.823E-01	1.310E+01	6.000E-06
3.299E+01	9.997E+01	8.870E-03	2.305E-01	2.394E-01	1.147E+01	8.000E-06
4.020E+01	9.999E+01	1.742E-03	2.076E-01	2.094E-01	6.736E+00	1.000E-05
5.817E+01	1.000E+02	3.741E-05	1.529E-01	1.529E-01	1.542E+01	1.500E-05
9.345E+01	1.000E+02	3.244E-05	7.671E-02	7.674E-02	6.634E+00	2.500E-05
1.453E+02	1.000E+02	3.981E-05	4.425E-02	4.429E-02	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.1483 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.500E+01 UM INLET SIGMAP = 2.500E+00

OUTLET MMD = 5.089E+00 UM OUTLET SIGMAP = 2.423E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

E.P.A. ESP MODEL

I.E.R.L.-R.T.P. AND SO.R.I.

REVISION 1,JAN. 1, 1978

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 10 NDATA = 2

DATA ON CARD NUMBER 2

LAB ESP; SCA=125FT2/1000ACFM;J=20UA/FT2;MMD=25UM;SIGMAP=2.5

DATA ON CARD NUMBER 3

D50 = 25.0000 UM SIGMAP = 2.5000

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=25UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 36.64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1288	3.622E+05	2.7817E+05	2.1940E+13	25.8	2.51E-05	2.590E-05	7.589E-04	2.39E-07	2.58E-04	1
1.0351	3.622E+05	2.7386E+05	2.3925E+13	25.8	1.33E-05	5.316E-06	1.557E-04	9.87E-08	2.58E-04	2
1.0120	3.622E+05	2.7273E+05	2.4472E+13	25.8	9.28E-06	1.605E-06	4.701E-05	4.72E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 36.64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0047	3.606E+05	2.7150E+05	2.4759E+13	25.8	6.91E-06	6.741E-07	1.975E-05	2.67E-08	2.58E-04	4
1.0019	3.606E+05	2.7150E+05	2.4826E+13	25.8	5.56E-06	3.372E-07	9.879E-06	1.66E-08	2.58E-04	5
1.0008	3.606E+05	2.7150E+05	2.4853E+13	25.8	4.59E-06	1.866E-07	5.466E-06	1.09E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 36.64

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0004	3.496E+05	2.6439E+05	2.5649E+13	25.8	3.85E-06	1.080E-07	3.165E-06	7.26E-09	2.58E-04	7
1.0002	3.496E+05	2.6439E+05	2.5654E+13	25.8	3.45E-06	6.788E-08	1.989E-06	5.13E-09	2.58E-04	8
1.0001	3.496E+05	2.6439E+05	2.5656E+13	25.8	3.12E-06	4.431E-08	1.298E-06	3.72E-09	2.58E-04	9

1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	2.84E-06	2.982E-08	8.735E-07	2.75E-09	2.58E-04	10
1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	2.59E-06	2.057E-08	6.025E-07	2.07E-09	2.58E-04	11
1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	2.34E-06	1.446E-08	4.236E-07	1.57E-09	2.58E-04	12

EST. EFFICIENCY = 99.58 UNCORRECTED COMPUTED EFFICIENCY = 99.88

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=25UM;SIGMAP=2.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1507	3.622E+05	2.7914E+05	2.1523E+13	25.8	2.51E-05	2.590E-05	7.587E-04	2.38E-07	2.58E-04	1
1.0371	3.622E+05	2.7395E+05	2.3881E+13	25.8	1.33E-05	5.322E-06	1.559E-04	9.87E-08	2.58E-04	2
1.0114	3.622E+05	2.7271E+05	2.4486E+13	25.8	9.29E-06	1.606E-06	4.705E-05	4.72E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0040	3.606E+05	2.7142E+05	2.4775E+13	25.8	6.92E-06	6.742E-07	1.975E-05	2.66E-08	2.58E-04	4
1.0015	3.606E+05	2.7142E+05	2.4837E+13	25.8	5.57E-06	3.372E-07	9.878E-06	1.66E-08	2.58E-04	5
1.0006	3.606E+05	2.7142E+05	2.4860E+13	25.8	4.59E-06	1.865E-07	5.465E-06	1.09E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0002	3.496E+05	2.6438E+05	2.5653E+13	25.8	3.85E-06	1.080E-07	3.164E-06	7.26E-09	2.58E-04	7
1.0001	3.496E+05	2.6438E+05	2.5656E+13	25.8	3.45E-06	6.786E-08	1.988E-06	5.13E-09	2.58E-04	8
1.0000	3.496E+05	2.6438E+05	2.5657E+13	25.8	3.12E-06	4.429E-08	1.298E-06	3.72E-09	2.58E-04	9
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	2.84E-06	2.980E-08	8.731E-07	2.75E-09	2.58E-04	10
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	2.59E-06	2.056E-08	6.022E-07	2.06E-09	2.58E-04	11
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	2.34E-06	1.445E-08	4.234E-07	1.56E-09	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. D/DSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.6678	1.6284	1.5470	1.4831	1.4346	1.3037	1.2089	1.1679
3	1.8914	1.8041	1.6883	1.6020	1.5380	1.3698	1.2508	1.2000
4	2.0267	1.9063	1.7691	1.6693	1.5961	1.4059	1.2730	1.2167
5	2.1235	1.9785	1.8259	1.7166	1.6368	1.4313	1.2886	1.2284
6	2.1987	2.0341	1.8696	1.7528	1.6681	1.4507	1.3006	1.2375
7	2.2574	2.0751	1.9004	1.7775	1.6886	1.4617	1.3060	1.2408
8	2.3071	2.1100	1.9268	1.7986	1.7062	1.4713	1.3060	1.2408
9	2.3503	2.1404	1.9498	1.8172	1.7218	1.4799	1.3060	1.2408
10	2.3885	2.1673	1.9702	1.8337	1.7356	1.4876	1.3060	1.2408
11	2.4227	2.1913	1.9885	1.8485	1.7481	1.4946	1.3060	1.2408
12	2.4536	2.2131	2.0051	1.8619	1.7594	1.4946	1.3060	1.2408

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	1.0332	1.0011	0.9569	0.9197	0.8985
2	1.1438	1.1245	1.0945	1.0621	1.0275
3	1.1705	1.1494	1.1174	1.0861	1.0636
4	1.1841	1.1615	1.1273	1.0942	1.0711
5	1.1937	1.1700	1.1342	1.0997	1.0757
6	1.2012	1.1765	1.1394	1.0997	1.0757
7	1.2034	1.1782	1.1394	1.0997	1.0757
8	1.2034	1.1782	1.1394	1.0997	1.0757
9	1.2034	1.1782	1.1394	1.0997	1.0757
10	1.2034	1.1782	1.1394	1.0997	1.0757
11	1.2034	1.1782	1.1394	1.0997	1.0757
12	1.2034	1.1782	1.1394	1.0997	1.0757

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.34192E-15	0.81097E-15
2	0.21390E-17	0.66536E-17	0.13310E-16	0.22014E-16	0.32717E-16	0.11538E-15	0.42231E-15	0.91418E-15
3	0.24259E-17	0.73716E-17	0.14525E-16	0.23779E-16	0.35076E-16	0.12123E-15	0.43695E-15	0.93933E-15
4	0.25994E-17	0.77892E-17	0.15220E-16	0.24778E-16	0.36401E-16	0.12443E-15	0.44470E-15	0.95235E-15
5	0.27236E-17	0.80841E-17	0.15709E-16	0.25479E-16	0.37330E-16	0.12667E-15	0.45016E-15	0.96156E-15
6	0.28201E-17	0.83113E-17	0.16085E-16	0.26017E-16	0.38042E-16	0.12839E-15	0.45435E-15	0.96865E-15
7	0.28953E-17	0.84789E-17	0.16350E-16	0.26383E-16	0.38510E-16	0.12936E-15	0.45623E-15	0.97125E-15
8	0.29591E-17	0.86215E-17	0.16577E-16	0.26697E-16	0.38913E-16	0.13021E-15	0.45623E-15	0.97125E-15
9	0.30145E-17	0.87457E-17	0.16775E-16	0.26972E-16	0.39267E-16	0.13097E-15	0.45623E-15	0.97125E-15
10	0.30635E-17	0.88555E-17	0.16950E-16	0.27217E-16	0.39583E-16	0.13166E-15	0.45623E-15	0.97125E-15
11	0.31073E-17	0.89539E-17	0.17108E-16	0.27437E-16	0.39867E-16	0.13228E-15	0.45623E-15	0.97125E-15
12	0.31469E-17	0.90429E-17	0.17251E-16	0.27636E-16	0.40126E-16	0.13228E-15	0.45623E-15	0.97125E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.14349E-14	0.21699E-14	0.46594E-14	0.12424E-13	0.31049E-13
2	0.15884E-14	0.24373E-14	0.53291E-14	0.14347E-13	0.35509E-13
3	0.16256E-14	0.24913E-14	0.54407E-14	0.14672E-13	0.36757E-13
4	0.16445E-14	0.25174E-14	0.54889E-14	0.14782E-13	0.37015E-13
5	0.16578E-14	0.25358E-14	0.55223E-14	0.14855E-13	0.37176E-13
6	0.16681E-14	0.25499E-14	0.55476E-14	0.14855E-13	0.37176E-13
7	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13
8	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13
9	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13
10	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13
11	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13
12	0.16713E-14	0.25536E-14	0.55476E-14	0.14855E-13	0.37176E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	1.751	0.000	0.0113	0.0016	89.1173	9.025	10.8827	89.1173	9.025	10.8827
4.000E-07	1.361	0.001	0.1490	0.0218	89.0458	8.998	10.9542	89.0458	8.998	10.9542
6.000E-07	1.239	0.004	0.5270	0.6062	90.6808	9.656	9.3192	26.6099	1.259	73.3901
8.000E-07	1.179	0.010	1.0964	0.9901	92.2882	10.426	7.7118	52.3279	3.014	47.6721
1.000E-06	1.144	0.018	1.7616	1.3583	93.5635	11.161	6.4365	66.0251	4.392	33.9749
2.000E-06	1.072	0.904	38.5150	21.1966	97.1464	14.471	2.8536	89.2492	9.074	10.7508
4.000E-06	1.036	3.202	44.3498	24.9761	99.0726	19.044	0.9274	96.4249	13.554	3.5751
6.000E-06	1.024	3.863	10.6353	12.7798	99.8157	25.618	0.1843	98.4838	17.044	1.5162
8.000E-06	1.018	5.501	2.4700	10.1875	99.9699	32.997	0.0301	99.1512	19.405	0.8488
1.000E-05	1.014	4.745	0.3631	5.8255	99.9949	40.196	0.0051	99.4373	21.077	0.5627
1.500E-05	1.010	20.198	0.0299	13.2149	99.9999	58.189	0.0001	99.7001	23.638	0.2999
2.500E-05	1.006	20.697	0.0312	5.6846	99.9999	93.134	0.0001	99.8741	27.170	0.1259
4.000E-05	1.004	40.856	0.0605	3.1568	99.9999	145.361	0.0001	99.9646	32.330	0.0354

EFFICIENCY = STATED = 99.88 COMPUTED = 99.8791 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9330
MMD OF INLET SIZE DISTRIBUTION = 2.500E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 2.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.777E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.766E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 29.738

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.5416
CORRECTED MMD OF EFFLUENT = 5.866E+00
CORRECTED SIGMAP OF EFFLUENT = 2.197E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
CORRECTED PRECIPITATION RATE PARAMETER = 21.91

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.714E+00	5.986E+01	5.929E-06	1.653E-04	1.712E-04	5.350E-02	2.000E-07
4.264E+00	6.494E+01	1.687E-04	1.864E-03	2.033E-03	2.806E-01	4.000E-07
5.029E+00	7.095E+01	9.061E-04	6.230E-03	7.136E-03	6.176E-01	6.000E-07
5.825E+00	7.611E+01	2.524E-03	1.308E-02	1.560E-02	9.685E-01	8.000E-07
6.624E+00	8.037E+01	5.079E-03	2.173E-02	2.681E-02	1.285E+00	1.000E-06
1.056E+01	9.254E+01	2.299E-02	6.361E-02	8.660E-02	1.817E+01	2.000E-06
1.814E+01	9.884E+01	4.545E-02	1.298E-01	1.752E-01	2.159E+01	4.000E-06
2.562E+01	9.982E+01	2.036E-02	1.471E-01	1.674E-01	1.310E+01	6.000E-06
3.300E+01	9.997E+01	5.164E-03	1.406E-01	1.458E-01	1.147E+01	8.000E-06
4.020E+01	9.999E+01	1.164E-03	1.267E-01	1.278E-01	6.736E+00	1.000E-05
5.819E+01	1.000E+02	3.086E-05	9.328E-02	9.331E-02	1.542E+01	1.500E-05
9.313E+01	1.000E+02	3.758E-05	4.680E-02	4.684E-02	6.634E+00	2.500E-05
1.454E+02	1.000E+02	7.561E-05	2.700E-02	2.707E-02	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.5416 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 2.500E+01 UM INLET SIGMAP = 2.500E+00

OUTLET MMD = 5.866E+00 UM OUTLET SIGMAP = 2.197E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION 1,JAN. 1, 1978      *
*                                    *
**************************************
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 14 NDATA = 2

DATA ON CARD NUMBER 2

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=1.5

DATA ON CARD NUMBER 3

D50 = 10.0000 UM SIGMAP = 1.5000

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=1.5

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2552	3.622E+05	2.8366E+05	1.9731E+13	25.8	1.02E-05	1.846E-05	5.407E-04	3.48E-07	2.58E-04	1
1.0760	3.622E+05	2.7579E+05	2.3017E+13	25.8	8.83E-06	8.532E-06	2.499E-04	2.11E-07	2.58E-04	2
1.0225	3.622E+05	2.7327E+05	2.4221E+13	25.8	7.69E-06	3.720E-06	1.090E-04	1.08E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0070	3.606E+05	2.7161E+05	2.4702E+13	25.8	7.02E-06	1.738E-06	5.092E-05	5.69E-08	2.58E-04	4
1.0023	3.606E+05	2.7161E+05	2.4818E+13	25.8	6.47E-06	8.673E-07	2.541E-05	3.15E-08	2.58E-04	5
1.0008	3.606E+05	2.7161E+05	2.4856E+13	25.8	5.97E-06	4.532E-07	1.328E-05	1.80E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0002	3.496E+05	2.6438E+05	2.5652E+13	25.8	5.52E-06	2.404E-07	7.042E-06	1.03E-08	2.58E-04	7
1.0001	3.496E+05	2.6438E+05	2.5656E+13	25.8	5.16E-06	1.361E-07	3.987E-06	6.19E-09	2.58E-04	8
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	4.83E-06	7.919E-08	2.320E-06	3.82E-09	2.58E-04	9

1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	4.51E-06	4.717E-08	1.382E-06	2.41E-09	2.58E-04	10
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	4.19E-06	2.869E-08	8.405E-07	1.54E-09	2.58E-04	11
1.0000	3.496E+05	2.6438E+05	2.5659E+13	25.8	3.91E-06	1.778E-08	5.208E-07	1.00E-09	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. D/DSATE FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.6566	1.6194	1.5397	1.4769	1.4292	1.3003	1.2067	1.1662
3	1.8837	1.7982	1.6835	1.5981	1.5346	1.3676	1.2494	1.1990
4	2.0211	1.9021	1.7658	1.6666	1.5937	1.4044	1.2720	1.2159
5	2.1193	1.9753	1.8234	1.7145	1.6350	1.4301	1.2879	1.2279
6	2.1954	2.0316	1.8676	1.7512	1.6666	1.4498	1.3001	1.2370
7	2.2546	2.0730	1.8987	1.7761	1.6873	1.4609	1.3055	1.2404
8	2.3047	2.1082	1.9253	1.7974	1.7052	1.4706	1.3055	1.2404
9	2.3482	2.1388	1.9485	1.8161	1.7208	1.4793	1.3055	1.2404
10	2.3866	2.1659	1.9691	1.8327	1.7348	1.4870	1.3055	1.2404
11	2.4210	2.1901	1.9875	1.8476	1.7473	1.4941	1.3055	1.2404
12	2.4520	2.2120	2.0042	1.8612	1.7587	1.4941	1.3055	1.2404

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	1.0011	0.9732	0.9342	0.9007	0.8814
2	1.1390	1.1200	1.0899	1.0559	1.0168
3	1.1681	1.1472	1.1155	1.0843	1.0618
4	1.1825	1.1600	1.1261	1.0932	1.0701
5	1.1925	1.1689	1.1332	1.0989	1.0751
6	1.2002	1.1756	1.1387	1.1031	1.0751
7	1.2026	1.1774	1.1387	1.1031	1.0751
8	1.2026	1.1774	1.1387	1.1031	1.0751
9	1.2026	1.1774	1.1387	1.1031	1.0751
10	1.2026	1.1774	1.1387	1.1031	1.0751
11	1.2026	1.1774	1.1387	1.1031	1.0751
12	1.2026	1.1774	1.1387	1.1031	1.0751

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.36192E-15	0.81097E-15
2	0.21247E-17	0.66167E-17	0.13247E-16	0.21922E-16	0.32594E-16	0.11508E-15	0.42153E-15	0.91285E-15
3	0.24160E-17	0.73473E-17	0.14484E-16	0.23720E-16	0.34994E-16	0.12104E-15	0.43647E-15	0.93850E-15
4	0.25923E-17	0.77722E-17	0.15192E-16	0.24737E-16	0.36346E-16	0.12430E-15	0.44437E-15	0.95177E-15
5	0.27182E-17	0.80713E-17	0.15688E-16	0.25448E-16	0.37289E-16	0.12657E-15	0.44991E-15	0.96113E-15
6	0.28157E-17	0.83011E-17	0.16068E-16	0.25993E-16	0.38010E-16	0.12831E-15	0.45415E-15	0.96830E-15
7	0.28916E-17	0.84703E-17	0.16336E-16	0.26362E-16	0.38482E-16	0.12929E-15	0.45605E-15	0.97094E-15
8	0.29560E-17	0.86142E-17	0.16564E-16	0.26679E-16	0.38889E-16	0.13015E-15	0.45605E-15	0.97094E-15
9	0.30118E-17	0.87392E-17	0.16764E-16	0.26956E-16	0.39246E-16	0.13092E-15	0.45605E-15	0.97094E-15
10	0.30610E-17	0.88497E-17	0.16941E-16	0.27202E-16	0.39564E-16	0.13161E-15	0.45605E-15	0.97094E-15
11	0.31051E-17	0.89487E-17	0.17099E-16	0.27424E-16	0.39850E-16	0.13223E-15	0.45605E-15	0.97094E-15
12	0.31449E-17	0.90382E-17	0.17243E-16	0.27625E-16	0.40110E-16	0.13223E-15	0.45605E-15	0.97094E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.13903E-14	0.21093E-14	0.45484E-14	0.12167E-13	0.30460E-13
2	0.15819E-14	0.24274E-14	0.53068E-14	0.14264E-13	0.35139E-13
3	0.16223E-14	0.24865E-14	0.54314E-14	0.14648E-13	0.36694E-13
4	0.16422E-14	0.25142E-14	0.54829E-14	0.14767E-13	0.36980E-13
5	0.16562E-14	0.25334E-14	0.55179E-14	0.14845E-13	0.37152E-13
6	0.16668E-14	0.25481E-14	0.55442E-14	0.14902E-13	0.37152E-13
7	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13
8	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13
9	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13
10	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13
11	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13
12	0.16701E-14	0.25519E-14	0.55442E-14	0.14902E-13	0.37152E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	1.751	0.000	0.0000	0.0000	89.1100	9.022	10.8900	89.1100	9.022	10.8900
4.000E-07	1.361	0.000	0.0000	0.0000	89.0481	8.999	10.9519	89.0481	8.999	10.9519
6.000E-07	1.239	0.000	0.0000	0.0000	90.6889	9.659	9.3111	90.6889	9.659	9.3111
8.000E-07	1.179	0.000	0.0000	0.0000	92.2995	10.432	7.7005	92.2995	10.432	7.7005
1.000E-06	1.144	0.000	0.0002	0.0000	93.5761	11.169	6.4239	93.5761	11.169	6.4239
2.000E-06	1.072	0.113	4.0955	16.4005	97.1579	14.488	2.8421	29.5699	1.426	70.4301
4.000E-06	1.036	4.726	55.3402	27.6403	99.0789	19.072	0.9211	97.1532	14.481	2.8468
6.000E-06	1.024	13.167	30.5407	16.2829	99.8175	25.660	0.1825	99.3980	20.803	0.6020
8.000E-06	1.018	22.798	8.8115	11.3570	99.9696	32.951	0.0304	99.7575	24.502	0.2425
1.000E-05	1.014	17.612	1.1595	6.0223	99.9948	40.153	0.0052	99.8336	26.033	0.1664
1.500E-05	1.010	36.059	0.0455	13.3598	99.9999	58.153	0.0001	99.8197	25.707	0.1803
2.500E-05	1.006	5.255	0.0066	5.7462	99.9999	93.427	0.0001	99.4678	21.304	0.5322
4.000E-05	1.004	0.270	0.0003	3.1910	99.9999	145.268	0.0001	94.2438	11.616	5.7562

EFFICIENCY = STATED = 99.88 COMPUTED = 99.9052 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9213
MMD OF INLET SIZE DISTRIBUTION = 1.000E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 1.500E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 4.679E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.390E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 29.083

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.5132
CORRECTED MMD OF EFFLUENT = 8.198E+00
CORRECTED SIGMAP OF EFFLUENT = 1.527E+00
LOG-NORMAL GOODNESS OF FIT = 0.979
CORRECTED PRECIPITATION RATE PARAMETER = 21.67

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.713E+00	5.985E+01	2.251E-17	1.774E-04	1.774E-04	5.350E-02	2.000E-07
4.265E+00	6.494E+01	1.378E-12	2.001E-03	2.001E-03	2.806E-01	4.000E-07
5.031E+00	7.096E+01	6.480E-10	6.687E-03	6.687E-03	6.176E-01	6.000E-07
5.828E+00	7.612E+01	3.731E-08	1.404E-02	1.404E-02	9.685E-01	8.000E-07
6.629E+00	8.039E+01	6.816E-07	2.332E-02	2.333E-02	1.285E+00	1.000E-06
1.057E+01	9.257E+01	2.871E-03	6.828E-02	7.115E-02	1.817E+01	2.000E-06
1.816E+01	9.885E+01	6.663E-02	1.393E-01	2.059E-01	2.159E+01	4.000E-06
2.566E+01	9.982E+01	6.867E-02	1.579E-01	2.266E-01	1.310E+01	6.000E-06
3.295E+01	9.997E+01	2.164E-02	1.509E-01	1.726E-01	1.147E+01	8.000E-06
4.015E+01	9.999E+01	4.366E-03	1.360E-01	1.403E-01	6.736E+00	1.000E-05
5.815E+01	1.000E+02	5.509E-05	1.001E-01	1.002E-01	1.542E+01	1.500E-05
9.343E+01	1.000E+02	9.363E-06	5.024E-02	5.025E-02	6.634E+00	2.500E-05
1.453E+02	1.000E+02	5.090E-07	2.898E-02	2.898E-02	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.5132 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V
AVG. CURRENT DENSITY = 25.81 NA/CM**2
RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.000E+01 UM INLET SIGMAP = 1.500E+00
OUTLET MMD = 8.198E+00 UM OUTLET SIGMAP = 1.527E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*        REVISION 1,JAN. 1, 1978     *
*                                    *
**************************************
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 14 NDATA = 2

DATA ON CARD NUMBER 2

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=5.0

DATA ON CARD NUMBER 3

D50 = 10.0000 UM SIGMAP = 5.0000

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=5.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E+05 AMP/M
1/2 WIRE TO WIRE = 6.350E+02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E+04 M2/VOLT-SEC
DUST WEIGHT = 3.250E+06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E+03 M
CURRENT DENSITY = 2.581E+04 AMP/M2
GAS FLOW RATE = 9.460E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E+04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E+01 M/SEC
VISCOSITY = 1.800E+05 KG/M-SEC
PART. PATH PARAM. = 5.708E+08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.8631	3.622E+05	3.0900E+05	1.3293E+13	25.8	1.99E-05	1.825E-05	5.347E-04	3.72E-07	2.58E-04	1
1.4153	3.622E+05	2.9136E+05	1.7499E+13	25.8	7.36E-06	5.980E-06	1.752E-04	3.96E-07	2.58E-04	2
1.2031	3.622E+05	2.8143E+05	2.0585E+13	25.8	3.83E-06	2.852E-06	8.355E-05	3.46E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E+05 AMP/M
1/2 WIRE TO WIRE = 6.350E+02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E+04 M2/VOLT-SEC
DUST WEIGHT = 3.250E+06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E+03 M
CURRENT DENSITY = 2.581E+04 AMP/M2
GAS FLOW RATE = 9.460E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E+04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E+01 M/SEC
VISCOSITY = 1.800E+05 KG/M-SEC
PART. PATH PARAM. = 5.708E+08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1005	3.606E+05	2.7591E+05	2.2602E+13	25.8	2.70E-06	1.734E-06	5.081E-05	3.05E-07	2.58E-04	4
1.0504	3.606E+05	2.7363E+05	2.3680E+13	25.8	1.97E-06	1.184E-06	3.468E-05	2.74E-07	2.58E-04	5
1.0254	3.606E+05	2.7247E+05	2.4258E+13	25.8	1.75E-06	8.575E-07	2.512E-05	2.47E-07	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E+05 AMP/M
1/2 WIRE TO WIRE = 6.350E+02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E+04 M2/VOLT-SEC
DUST WEIGHT = 3.250E+06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E+03 M
CURRENT DENSITY = 2.581E+04 AMP/M2
GAS FLOW RATE = 9.460E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E+04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E+01 M/SEC
VISCOSITY = 1.800E+05 KG/M-SEC
PART. PATH PARAM. = 5.708E+08 M
INPUT EFF./INCR. = 42.86

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0125	3.496E+05	2.6494E+05	2.5343E+13	25.8	1.60E-06	6.289E-07	1.843E-05	2.16E-07	2.58E-04	7
1.0063	3.496E+05	2.6494E+05	2.5497E+13	25.8	1.47E-06	4.884E-07	1.431E-05	1.96E-07	2.58E-04	8
1.0032	3.496E+05	2.6494E+05	2.5576E+13	25.8	1.36E-06	3.868E-07	1.133E-05	1.78E-07	2.58E-04	9

1.0017	3.496E+05	2.6494E+05	2.5616E+13	25.8	1.27E-06	3.112E-07	9.117E-06	1.61E-07	2.58E-04	10
1.0008	3.496E+05	2.6494E+05	2.5637E+13	25.8	1.17E-06	2.535E-07	7.426E-06	1.46E-07	2.58E-04	11
1.0004	3.496E+05	2.6494E+05	2.5647E+13	25.8	1.08E-06	2.086E-07	6.112E-06	1.33E-07	2.58E-04	12

EST. EFFICIENCY = 99.88 UNCORRECTED COMPUTED EFFICIENCY = 96.47

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=5.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.4898	3.622E+05	2.9492E+05	1.6624E+13	25.8	1.98E-05	1.839E-05	5.387E-04	3.85E-07	2.58E-04	1
1.3125	3.622E+05	2.8604E+05	1.8869E+13	25.8	7.33E-06	5.874E-06	1.721E-04	3.97E-07	2.58E-04	2
1.2028	3.622E+05	2.8141E+05	2.0590E+13	25.8	3.78E-06	2.833E-06	8.299E-05	3.49E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1329	3.606E+05	2.7735E+05	2.1956E+13	25.8	2.65E-06	1.731E-06	5.072E-05	3.08E-07	2.58E-04	4
1.0882	3.606E+05	2.7535E+05	2.2858E+13	25.8	1.95E-06	1.182E-06	3.464E-05	2.76E-07	2.58E-04	5
1.0589	3.606E+05	2.7401E+05	2.3491E+13	25.8	1.74E-06	8.561E-07	2.508E-05	2.48E-07	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0382	3.496E+05	2.6612E+05	2.4714E+13	25.8	1.58E-06	6.275E-07	1.838E-05	2.17E-07	2.58E-04	7
1.0258	3.496E+05	2.6556E+05	2.5014E+13	25.8	1.46E-06	4.868E-07	1.426E-05	1.96E-07	2.58E-04	8
1.0174	3.496E+05	2.6556E+05	2.5220E+13	25.8	1.38E-06	3.860E-07	1.131E-05	1.78E-07	2.58E-04	9
1.0118	3.496E+05	2.6556E+05	2.5360E+13	25.8	1.26E-06	3.108E-07	9.104E-06	1.61E-07	2.58E-04	10
1.0080	3.496E+05	2.6556E+05	2.5456E+13	25.8	1.17E-06	2.533E-07	7.421E-06	1.47E-07	2.58E-04	11
1.0054	3.496E+05	2.6556E+05	2.5521E+13	25.8	1.08E-06	2.086E-07	6.111E-06	1.33E-07	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9776
2	1.5976	1.5712	1.5004	1.4436	1.4000	1.2815	1.1947	1.1498
3	1.8253	1.7531	1.6475	1.5678	1.5083	1.3509	1.2389	1.1876
4	1.9687	1.8625	1.7343	1.6403	1.5709	1.3900	1.2629	1.2069
5	2.0732	1.9409	1.7962	1.6918	1.6154	1.4177	1.2801	1.2204
6	2.1549	2.0016	1.8439	1.7315	1.6496	1.4391	1.2933	1.2307
7	2.2188	2.0465	1.8778	1.7586	1.6722	1.4512	1.2993	1.2345
8	2.2730	2.0847	1.9067	1.7818	1.6916	1.4619	1.2993	1.2345
9	2.3199	2.1178	1.9318	1.8021	1.7087	1.4713	1.2993	1.2345
10	2.3611	2.1469	1.9540	1.8201	1.7237	1.4798	1.2993	1.2345
11	2.3978	2.1729	1.9738	1.8361	1.7373	1.4875	1.2993	1.2345
12	2.4309	2.1963	1.9917	1.8506	1.7495	1.4945	1.2993	1.2345

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.9432	0.9214	0.8902	0.8628	0.8466
2	1.1224	1.1035	1.0717	1.0228	0.9843
3	1.1576	1.1376	1.1069	1.0760	1.0519
4	1.1743	1.1527	1.1198	1.0877	1.0647
5	1.1859	1.1629	1.1283	1.0947	1.0713
6	1.1946	1.1707	1.1346	1.0998	1.0757
7	1.1974	1.1727	1.1357	1.0998	1.0757
8	1.1974	1.1727	1.1357	1.0998	1.0757
9	1.1974	1.1727	1.1357	1.0998	1.0757
10	1.1974	1.1727	1.1357	1.0998	1.0757
11	1.1974	1.1727	1.1357	1.0998	1.0757
12	1.1974	1.1727	1.1357	1.0998	1.0757

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.36192E-15	0.76521E-15
2	0.20490E-17	0.64198E-17	0.12909E-16	0.21427E-16	0.31930E-16	0.11341E-15	0.41735E-15	0.89999E-15
3	0.23412E-17	0.71631E-17	0.14174E-16	0.23271E-16	0.34399E-16	0.11956E-15	0.43278E-15	0.92962E-15
4	0.25250E-17	0.76101E-17	0.14921E-16	0.24346E-16	0.35827E-16	0.12302E-15	0.44119E-15	0.94469E-15
5	0.26590E-17	0.79304E-17	0.15453E-16	0.25111E-16	0.36841E-16	0.12547E-15	0.44718E-15	0.95526E-15
6	0.27638E-17	0.81784E-17	0.15864E-16	0.25700E-16	0.37622E-16	0.12736E-15	0.45180E-15	0.96335E-15
7	0.28458E-17	0.83621E-17	0.16156E-16	0.26103E-16	0.38137E-16	0.12844E-15	0.45388E-15	0.96635E-15
8	0.29153E-17	0.85181E-17	0.16404E-16	0.26448E-16	0.38580E-16	0.12938E-15	0.45388E-15	0.96635E-15
9	0.29754E-17	0.86533E-17	0.16620E-16	0.26748E-16	0.38968E-16	0.13022E-15	0.45388E-15	0.96635E-15
10	0.30283E-17	0.87723E-17	0.16811E-16	0.27015E-16	0.39312E-16	0.13097E-15	0.45388E-15	0.96635E-15
11	0.30754E-17	0.88784E-17	0.16982E-16	0.27253E-16	0.39621E-16	0.13165E-15	0.45388E-15	0.96635E-15
12	0.31178E-17	0.89740E-17	0.17136E-16	0.27468E-16	0.39900E-16	0.13227E-15	0.45388E-15	0.96635E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.13099E-14	0.19970E-14	0.43343E-14	0.11655E-13	0.29257E-13
2	0.15588E-14	0.23917E-14	0.52180E-14	0.13816E-13	0.34016E-13
3	0.16077E-14	0.24656E-14	0.53894E-14	0.14535E-13	0.36353E-13
4	0.16309E-14	0.24983E-14	0.54523E-14	0.14693E-13	0.36794E-13
5	0.16469E-14	0.25206E-14	0.54937E-14	0.14788E-13	0.37021E-13
6	0.16591E-14	0.25373E-14	0.55243E-14	0.14857E-13	0.37173E-13
7	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13
8	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13
9	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13
10	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13
11	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13
12	0.16629E-14	0.25418E-14	0.55299E-14	0.14857E-13	0.37173E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	1.751	1.259	11.2085	5.3793	89.0057	8.983	10.9943	88.9483	8.962	11.0517
4.000E-07	1.361	1.671	14.8418	7.2326	89.0270	8.991	10.9730	88.8000	8.908	11.2000
6.000E-07	1.239	1.793	13.4726	6.7551	90.7177	9.672	9.2823	90.2519	9.473	9.7481
8.000E-07	1.179	1.811	11.2089	5.8576	92.3545	10.461	7.6455	91.6314	10.093	8.3686
1.000E-06	1.144	1.785	9.1818	5.0551	93.6446	11.213	6.3554	92.6712	10.633	7.3288
2.000E-06	1.072	13.608	30.5018	24.0578	97.2313	14.594	2.7687	95.4260	12.551	4.5740
4.000E-06	1.036	11.718	8.3786	15.2804	99.1168	19.243	0.8832	96.6262	13.790	3.3738
6.000E-06	1.024	7.114	1.0231	7.3345	99.8224	25.769	0.1776	97.3327	14.746	2.6673
8.000E-06	1.018	6.795	0.1613	6.0696	99.9707	33.099	0.0293	97.6890	15.329	2.3110
1.000E-05	1.014	4.481	0.0178	3.5287	99.9951	40.363	0.0049	97.9626	15.842	2.0374
1.500E-05	1.010	13.512	0.0011	8.0575	99.9999	58.261	0.0001	98.4572	16.973	1.5428
2.500E-05	1.006	10.237	0.0008	3.4666	99.9999	93.558	0.0001	99.1239	19.276	0.8761
4.000E-05	1.004	24.217	0.0020	1.9251	99.9999	145.995	0.0001	99.7943	25.172	0.2057

EFFICIENCY = STATED = 96.47 COMPUTED = 96.4708 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.7648
MMD OF INLET SIZE DISTRIBUTION = 1.000E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.000E+00
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 8.672E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.307E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 17.878

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 97.4128
CORRECTED MMD OF EFFLUENT = 2.358E+00
CORRECTED SIGMAP OF EFFLUENT = 3.764E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 14.87

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.697E+00	5.969E+01	1.089E-01	5.689E-04	1.095E-01	5.350E-02	2.000E-07
4.261E+00	6.491E+01	3.101E-01	6.417E-03	3.165E-01	2.806E-01	4.000E-07
5.037E+00	7.101E+01	4.274E-01	2.144E-02	4.488E-01	6.176E-01	6.000E-07
5.844E+00	7.622E+01	4.760E-01	4.502E-02	5.210E-01	9.685E-01	8.000E-07
6.655E+00	8.052E+01	4.884E-01	7.479E-02	5.631E-01	1.285E+00	1.000E-06
1.065E+01	9.271E+01	3.358E-01	2.190E-01	5.548E-01	1.817E+01	2.000E-06
1.833E+01	9.889E+01	1.584E-01	4.467E-01	6.051E-01	2.159E+01	4.000E-06
2.577E+01	9.982E+01	3.612E-02	5.063E-01	5.424E-01	1.310E+01	6.000E-06
3.310E+01	9.997E+01	6.220E-03	4.840E-01	4.903E-01	1.147E+01	8.000E-06
4.036E+01	1.000E+02	1.055E-03	4.360E-01	4.371E-01	6.736E+00	1.000E-05
5.826E+01	1.000E+02	2.064E-05	3.211E-01	3.211E-01	1.542E+01	1.500E-05
9.356E+01	1.000E+02	1.824E-05	1.611E-01	1.611E-01	6.634E+00	2.500E-05
1.460E+02	1.000E+02	4.568E-05	9.293E-02	9.297E-02	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 97.4128 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.000E+01 UM INLET SIGMAP = 5.000E+00

OUTLET MMD = 2.358E+00 UM OUTLET SIGMAP = 3.764E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*        E.P.A. ESP MODEL            *
*                                    *
*    T.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*      REVISION I,JAN. 1, 1978       *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER    1

NENDPT = 14    NDATA =  2

DATA ON CARD NUMBER    2

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=10.0

DATA ON CARD NUMBER    3

D50 =  10.0000 UM  SIGMAP =  10.0000
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=10.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.8712	3.622E+05	3.0900E+05	1.3236E+13	25.8	2.64E-05	1.832E-05	5.366E-04	4.37E-07	2.58E-04	1
1.5921	3.622E+05	2.9971E+05	1.5556E+13	25.8	7.14E-06	5.227E-06	1.531E-04	5.61E-07	2.58E-04	2
1.4023	3.622E+05	2.8971E+05	1.7660E+13	25.8	3.05E-06	2.509E-06	7.351E-05	5.54E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2734	3.606E+05	2.8340E+05	1.9534E+13	25.8	1.90E-06	1.611E-06	4.720E-05	5.32E-07	2.58E-04	4
1.1870	3.606E+05	2.7973E+05	2.0956E+13	25.8	1.61E-06	1.161E-06	3.401E-05	5.06E-07	2.58E-04	5
1.1280	3.606E+05	2.7714E+05	2.2052E+13	25.8	1.40E-06	8.848E-07	2.592E-05	4.78E-07	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 24.32

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0850	3.496E+05	2.6823E+05	2.3649E+13	25.8	1.23E-06	6.804E-07	1.993E-05	4.36E-07	2.58E-04	7
1.0584	3.496E+05	2.6704E+05	2.4244E+13	25.8	1.09E-06	5.524E-07	1.618E-05	4.08E-07	2.58E-04	8
1.0401	3.496E+05	2.6620E+05	2.4670E+13	25.8	9.53E-07	4.564E-07	1.337E-05	3.80E-07	2.58E-04	9

1.0275	3.496E+05	2.4564E+05	2.4971E+13	25.8	8.39E-07	3.823E-07	1.120E-05	3.54E-07	2.58E-04	10
1.0189	3.496E+05	2.6564E+05	2.5182E+13	25.8	7.50E-07	3.240E-07	9.493E-06	3.29E-07	2.58E-04	11
1.0130	3.496E+05	2.6564E+05	2.5330E+13	25.8	6.78E-07	2.768E-07	8.109E-06	3.05E-07	2.58E-04	12

EST. EFFICIENCY = 96.47 UNCORRECTED COMPUTED EFFICIENCY = 94.27

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=10.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.7596	3.622E+05	3.0731E+05	1.4075E+13	25.8	2.64E-05	1.840E-05	5.391E-04	4.41E-07	2.58E-04	1
1.5374	3.622E+05	2.9717E+05	1.6109E+13	25.8	7.08E-06	5.161E-06	1.512E-04	5.62E-07	2.58E-04	2
1.3804	3.622E+05	2.8882E+05	1.7941E+13	25.8	3.03E-06	2.495E-06	7.308E-05	5.56E-07	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2691	3.606E+05	2.8322E+05	1.9599E+13	25.8	1.90E-06	1.608E-06	4.712E-05	5.34E-07	2.58E-04	4
1.1916	3.606E+05	2.7993E+05	2.0874E+13	25.8	1.60E-06	1.161E-06	3.401E-05	5.08E-07	2.58E-04	5
1.1365	3.606E+05	2.7751E+05	2.1886E+13	25.8	1.40E-06	8.852E-07	2.593E-05	4.79E-07	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0944	3.496E+05	2.6865E+05	2.3446E+13	25.8	1.23E-06	6.80AE-07	1.994E-05	4.37E-07	2.58E-04	7
1.0675	3.496E+05	2.6744E+05	2.4037E+13	25.8	1.09E-06	5.526E-07	1.619E-05	4.08E-07	2.58E-04	A
1.0482	3.496E+05	2.6657E+05	2.447AE+13	25.8	9.52E-07	4.565E-07	1.337E-05	3.81E-07	2.58E-04	9
1.0345	3.496E+05	2.6595E+05	2.4803E+13	25.8	8.38E-07	3.823E-07	1.120E-05	3.54E-07	2.58E-04	10
1.0247	3.496E+05	2.6595E+05	2.5041E+13	25.8	7.49E-07	3.240E-07	9.492E-06	3.29E-07	2.58E-04	11
1.0176	3.496E+05	2.6595E+05	2.5214E+13	25.8	6.78E-07	2.768E-07	8.108E-06	3.05E-07	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHRSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9678	0.9182
2	1.5522	1.5335	1.4696	1.4173	1.3770	1.2666	1.1754	1.1310
3	1.7782	1.7162	1.6179	1.5430	1.4867	1.3371	1.2257	1.1763
4	1.9241	1.8286	1.7073	1.6177	1.5514	1.3776	1.2524	1.1980
5	2.0322	1.9101	1.7719	1.6715	1.5978	1.4067	1.2712	1.2131
6	2.1177	1.9739	1.8221	1.7133	1.6339	1.4292	1.2856	1.2245
7	2.1851	2.0215	1.8581	1.7421	1.6579	1.4422	1.2922	1.2287
8	2.2425	2.0621	1.8888	1.7669	1.6787	1.4536	1.2981	1.2287
9	2.2922	2.0973	1.9156	1.7885	1.6969	1.4637	1.2981	1.2287
10	2.3359	2.1282	1.9392	1.8077	1.7130	1.4728	1.2981	1.2287
11	2.3747	2.1558	1.9603	1.8248	1.7274	1.4811	1.2981	1.2287
12	2.4097	2.1807	1.9793	1.8402	1.7405	1.4886	1.2981	1.2287

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.8909	0.8732	0.8476	0.8247	0.8110
2	1.1036	1.0836	1.0438	0.9869	0.9559
3	1.1474	1.1280	1.0979	1.0662	1.0359
4	1.1666	1.1456	1.1136	1.0820	1.0586
5	1.1796	1.1573	1.1235	1.0906	1.0674
6	1.1893	1.1659	1.1306	1.0965	1.0727
7	1.1924	1.1682	1.1320	1.0971	1.0730
8	1.1924	1.1682	1.1320	1.0971	1.0730
9	1.1924	1.1682	1.1320	1.0971	1.0730
10	1.1924	1.1682	1.1320	1.0971	1.0730
11	1.1924	1.1682	1.1320	1.0971	1.0730
12	1.1924	1.1682	1.1320	1.0971	1.0730

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.33810E-15	0.71874E-15
2	0.19908E-17	0.62659E-17	0.12643E-16	0.21037E-16	0.31405E-16	0.11209E-15	0.41061E-15	0.88531E-15
3	0.22806E-17	0.70125E-17	0.13920E-16	0.22902E-16	0.33906E-16	0.11834E-15	0.42819E-15	0.92074E-15
4	0.24679E-17	0.74715E-17	0.14689E-16	0.24011E-16	0.35381E-16	0.12192E-15	0.43749E-15	0.93778E-15
5	0.26065E-17	0.78048E-17	0.15244E-16	0.24810E-16	0.36441E-16	0.12449E-15	0.44406E-15	0.94954E-15
6	0.27161E-17	0.80653E-17	0.15676E-16	0.25430E-16	0.37263E-16	0.12649E-15	0.44910E-15	0.95846E-15
7	0.28026E-17	0.82599E-17	0.15986E-16	0.25858E-16	0.37811E-16	0.12764E-15	0.45141E-15	0.96181E-15
8	0.28762E-17	0.84257E-17	0.16251E-16	0.26226E-16	0.38285E-16	0.12865E-15	0.45348E-15	0.96181E-15
9	0.29399E-17	0.85695E-17	0.16481E-16	0.26547E-16	0.38699E-16	0.12955E-15	0.45348E-15	0.96181E-15
10	0.29959E-17	0.86960E-17	0.16684E-16	0.26831E-16	0.39067E-16	0.13035E-15	0.45348E-15	0.96181E-15
11	0.30458E-17	0.88088E-17	0.16866E-16	0.27085E-16	0.39396E-16	0.13108E-15	0.45348E-15	0.96181E-15
12	0.30907E-17	0.89102E-17	0.17029E-16	0.27314E-16	0.39694E-16	0.13174E-15	0.45348E-15	0.96181E-15

INCREMENT					
	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.12372E-14	0.18926E-14	0.41271E-14	0.11141E-13	0.28026E-13
2	0.15327E-14	0.23485E-14	0.50822E-14	0.13332E-13	0.33034E-13
3	0.15935E-14	0.24449E-14	0.53458E-14	0.14402E-13	0.35798E-13
4	0.16202E-14	0.24830E-14	0.54223E-14	0.14616E-13	0.36584E-13
5	0.16382E-14	0.25082E-14	0.54703E-14	0.14733E-13	0.36887E-13
6	0.16517E-14	0.25270E-14	0.55050E-14	0.14812E-13	0.37072E-13
7	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13
8	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13
9	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13
10	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13
11	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13
12	0.16559E-14	0.25320E-14	0.55115E-14	0.14820E-13	0.37081E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	1.751	4.216	25.1832	13.6014	88.9449	8.961	11.0551	88.9248	8.953	11.0752
4.000E-07	1.361	3.354	19.8533	10.8326	89.0439	8.997	10.9561	88.9115	8.948	11.0885
6.000E-07	1.239	2.812	14.0110	7.8382	90.7779	9.698	9.2221	90.4304	9.548	9.5696
8.000E-07	1.179	2.436	9.9556	5.8136	92.4355	10.505	7.5645	91.8064	10.179	8.1936
1.000E-06	1.144	2.156	7.2988	4.5271	93.7348	11.271	6.2652	92.7920	10.701	7.2080
2.000E-06	1.072	12.967	18.8454	18.5342	97.3102	14.712	2.6898	95.0932	12.266	4.9068
4.000E-06	1.036	9.176	4.2791	12.2556	99.1370	19.337	0.8630	95.4150	12.542	4.5850
6.000E-06	1.024	5.227	0.4887	6.3014	99.8270	25.875	0.1730	95.8612	12.958	4.1388
8.000E-06	1.018	4.885	0.0743	5.3253	99.9719	33.265	0.0281	96.2579	13.368	3.7421
1.000E-05	1.014	3.204	0.0081	3.1091	99.9953	40.581	0.0047	96.6682	13.841	3.3318
1.500E-05	1.010	9.809	0.0005	7.1063	99.9999	58.154	0.0001	97.5130	15.031	2.4870
2.500E-05	1.006	7.917	0.0004	3.0575	99.9999	93.469	0.0001	98.6742	17.590	1.3258
4.000E-05	1.004	31.841	0.0017	1.6979	99.9999	145.851	0.0001	99.8169	25.646	0.1831

EFFICIENCY = STATED = 94.27 COMPUTED = 94.2797 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.1492
MMD OF INLET SIZE DISTRIBUTION = 1.000E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 1.000E+01
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 5.633E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.646E+00
LOG-NORMAL GOODNESS OF FIT = 1.000
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 16.233

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 96.5670
CORRECTED MMD OF EFFLUENT = 1.591E+00
CORRECTED SIGMAP OF EFFLUENT = 4.715E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
CORRECTED PRECIPITATION RATE PARAMETER = 13.72

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.688E+00	5.960E+01	3.666E-01	6.658E-04	3.672E-01	5.350E-02	2.000E-07
4.264E+00	6.494E+01	6.215E-01	7.510E-03	6.290E-01	2.806E-01	4.000E-07
5.051E+00	7.110E+01	6.659E-01	2.510E-02	6.910E-01	6.176E-01	6.000E-07
5.868E+00	7.636E+01	6.335E-01	5.269E-02	6.862E-01	9.685E-01	8.000E-07
6.689E+00	8.068E+01	5.817E-01	8.753E-02	6.692E-01	1.285E+00	1.000E-06
1.074E+01	9.286E+01	3.109E-01	2.562E-01	5.671E-01	1.817E+01	2.000E-06
1.842E+01	9.802E+01	1.212E-01	5.228E-01	6.440E-01	2.159E+01	4.000E-06
2.58AE+01	9.983E+01	2.585E-02	5.925E-01	6.184E-01	1.310E+01	6.000E-06
3.326E+01	9.997E+01	4.293E-03	5.665E-01	5.708E-01	1.147E+01	8.000E-06
4.05AE+01	1.000E+02	7.149E-04	5.103E-01	5.110E-01	6.736E+00	1.000E-05
5.815E+01	1.000E+02	1.499E-05	3.758E-01	3.758E-01	1.542E+01	1.500E-05
9.347E+01	1.000E+02	1.410E-05	1.885E-01	1.885E-01	6.634E+00	2.500E-05
1.459E+02	1.000E+02	5.892E-05	1.088E-01	1.088E-01	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 96.5670 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.000E+01 UM INLET SIGMAP = 1.000E+01

OUTLET MMD = 1.591E+00 UM OUTLET SIGMAP = 4.715E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER    1

NENDPT = 14    NDATA =  2

DATA ON CARD NUMBER    2

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=15.0

DATA ON CARD NUMBER    3

D50 =  10.0000 UM  SIGMAP =  15.0000
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=15.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.8934	3.622E+05	3.0900E+05	1.3080E+13	25.8	2.75E-05	1.848E-05	5.414E-04	4.61E-07	2.58E-04	1
1.6400	3.622E+05	3.0192E+05	1.5101E+13	25.8	7.20E-06	4.955E-06	1.451E-04	6.24E-07	2.57E-04	2
1.4569	3.622E+05	2.9337E+05	1.6999E+13	25.8	2.77E-06	2.375E-06	6.957E-05	6.37E-07	2.57E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.3253	3.606E+05	2.8557E+05	1.8769E+13	25.8	1.78E-06	1.545E-06	4.526E-05	6.20E-07	2.57E-04	4
1.2328	3.606E+05	2.8170E+05	2.0177E+13	25.8	1.48E-06	1.135E-06	3.324E-05	5.98E-07	2.57E-04	5
1.1667	3.606E+05	2.7884E+05	2.1321E+13	25.8	1.27E-06	8.794E-07	2.576E-05	5.70E-07	2.57E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.21

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1157	3.496E+05	2.6959E+05	2.2999E+13	25.8	1.09E-06	6.864E-07	2.011E-05	5.24E-07	2.58E-04	7
1.0830	3.496E+05	2.6815E+05	2.3692E+13	25.8	9.34E-07	5.648E-07	1.655E-05	4.93E-07	2.58E-04	8
1.0595	3.496E+05	2.6709E+05	2.4217E+13	25.8	8.02E-07	4.725E-07	1.384E-05	4.62E-07	2.58E-04	9

1.0427	3.496E+05	2.6632E+05	2.460AE+13	25.8	7.09E-07	4.003F-07	1.173E-05	4.32E-07	2.58E-04	10
1.0306	3.496E+05	2.6578E+05	2.4897E+13	25.8	6.30E-07	3.425E-07	1.003E-05	4.02E-07	2.58E-04	11
1.0219	3.496E+05	2.6578E+05	2.5108E+13	25.8	5.69E-07	2.957E-07	8.662E-06	3.75E-07	2.58E-04	12

EST. EFFICIENCY = 94.27 UNCORRECTED COMPUTED EFFICIENCY = 93.54

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125FT2/1000ACFM;J=24UA/FT2;MMD=10UM;SIGMAP=15.0

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.8597	3.622E+05	3.0900E+05	1.3317E+13	25.8	2.75E-05	1.851E-05	5.424E-04	4.62E-07	2.58E-04	1
1.6220	3.622E+05	3.0109E+05	1.5269E+13	25.8	7.17E-06	4.928E-06	1.444E-04	6.24E-07	2.57E-04	2
1.4487	3.622E+05	2.9296E+05	1.7096E+13	25.8	2.75E-06	2.369E-06	6.939E-05	6.38E-07	2.57E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581F-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.3226	3.606E+05	2.8544E+05	1.8807E+13	25.8	1.77E-06	1.544E-06	4.522E-05	6.21E-07	2.57E-04	4
1.2333	3.606E+05	2.8172E+05	2.0169E+13	25.8	1.48E-06	1.134E-06	3.323E-05	5.99E-07	2.57E-04	5
1.1687	3.606E+05	2.7893E+05	2.1284E+13	25.8	1.27E-06	8.795E-07	2.576E-05	5.70E-07	2.57E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581F-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 20.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.1182	3.496E+05	2.6971E+05	2.2945E+13	25.8	1.09E-06	6.865E-07	2.011E-05	5.24E-07	2.58E-04	7
1.0857	3.496E+05	2.6827E+05	2.3633E+13	25.8	9.34E-07	5.649E-07	1.655E-05	4.93E-07	2.58E-04	8
1.0621	3.496E+05	2.6720E+05	2.4158E+13	25.8	8.02E-07	4.725E-07	1.384E-05	4.62E-07	2.58E-04	9
1.0450	3.496E+05	2.6642E+05	2.4554E+13	25.8	7.09E-07	4.003E-07	1.173E-05	4.32E-07	2.58E-04	10
1.0326	3.496E+05	2.6587E+05	2.4849E+13	25.8	6.30E-07	3.425E-07	1.003E-05	4.02E-07	2.58E-04	11
1.0236	3.496E+05	2.6587E+05	2.5068E+13	25.8	5.69E-07	2.956E-07	8.661E-06	3.75E-07	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSAT FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	0.9453	0.8994
2	1.5372	1.5209	1.4592	1.4085	1.3693	1.2615	1.1677	1.1236
3	1.7621	1.7036	1.6078	1.5344	1.4792	1.3324	1.2208	1.1721
4	1.9086	1.8167	1.6979	1.6098	1.5445	1.3733	1.2485	1.1949
5	2.0177	1.8992	1.7632	1.6643	1.5916	1.4027	1.2679	1.2104
6	2.1043	1.9639	1.8142	1.7068	1.6282	1.4256	1.2827	1.2222
7	2.1729	2.0124	1.8509	1.7361	1.6528	1.4389	1.2896	1.2267
8	2.2313	2.0538	1.8823	1.7614	1.6739	1.4506	1.2957	1.2267
9	2.2820	2.0897	1.9096	1.7835	1.6925	1.4610	1.2957	1.2267
10	2.3265	2.1213	1.9338	1.8031	1.7090	1.4703	1.2957	1.2267
11	2.3662	2.1495	1.9553	1.8206	1.7238	1.4787	1.2957	1.2267
12	2.4018	2.1748	1.9747	1.8364	1.7371	1.4864	1.2957	1.2267

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.8739	0.8574	0.8334	0.8117	0.7987
2	1.0958	1.0747	1.0284	0.9752	0.9463
3	1.1436	1.1244	1.0944	1.0619	1.0271
4	1.1638	1.1430	1.1113	1.0798	1.0563
5	1.1773	1.1552	1.1217	1.0891	1.0660
6	1.1874	1.1642	1.1292	1.0953	1.0717
7	1.1905	1.1666	1.1306	1.0959	1.0720
8	1.1905	1.1666	1.1306	1.0959	1.0720
9	1.1905	1.1666	1.1306	1.0959	1.0720
10	1.1905	1.1666	1.1306	1.0959	1.0720
11	1.1905	1.1666	1.1306	1.0959	1.0720
12	1.1905	1.1666	1.1306	1.0959	1.0720

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.6000E-06	0.8000E-06	0.1000E-05	0.2000E-05	0.4000E-05	0.6000E-05
1	0.13288E-17	0.42333E-17	0.89135E-17	0.15378E-16	0.23628E-16	0.91693E-16	0.33024E-15	0.70402E-15
2	0.19716E-17	0.62144E-17	0.12554E-16	0.20906E-16	0.31228E-16	0.11165E-15	0.40793E-15	0.87953E-15
3	0.22600E-17	0.69608E-17	0.13832E-16	0.22775E-16	0.33736E-16	0.11792E-15	0.42647E-15	0.91748E-15
4	0.24480E-17	0.74230E-17	0.14608E-16	0.23894E-16	0.35224E-16	0.12154E-15	0.43613E-15	0.93528E-15
5	0.25879E-17	0.77602E-17	0.15170E-16	0.24703E-16	0.36298E-16	0.12415E-15	0.44291E-15	0.94747E-15
6	0.26989E-17	0.80245E-17	0.15609E-16	0.25333E-16	0.37134E-16	0.12617E-15	0.44811E-15	0.95670E-15
7	0.27869E-17	0.82227E-17	0.15924E-16	0.25769E-16	0.37693E-16	0.12734E-15	0.45049E-15	0.96017E-15
8	0.28618E-17	0.83918E-17	0.16194E-16	0.26145E-16	0.38176E-16	0.12838E-15	0.45264E-15	0.96017E-15
9	0.29268E-17	0.85386E-17	0.16430E-16	0.26473E-16	0.38600E-16	0.12930E-15	0.45264E-15	0.96017E-15
10	0.29839E-17	0.86678E-17	0.16637E-16	0.26763E-16	0.38976E-16	0.13012E-15	0.45264E-15	0.96017E-15
11	0.30348E-17	0.87829E-17	0.16822E-16	0.27023E-16	0.39313E-16	0.13087E-15	0.45264E-15	0.96017E-15
12	0.30805E-17	0.88864E-17	0.16989E-16	0.27257E-16	0.39617E-16	0.13155E-15	0.45264E-15	0.96017E-15

	0.8000E-05	0.1000E-04	0.1500E-04	0.2500E-04	0.4000E-04
1	0.12137E-14	0.18584E-14	0.40578E-14	0.10966E-13	0.27602E-13
2	0.15218E-14	0.23293E-14	0.50074E-14	0.13173E-13	0.32701E-13
3	0.15883E-14	0.24370E-14	0.53286E-14	0.14344E-13	0.35494E-13
4	0.16163E-14	0.24774E-14	0.54111E-14	0.14586E-13	0.36505E-13
5	0.16350E-14	0.25037E-14	0.54617E-14	0.14712E-13	0.36839E-13
6	0.16490E-14	0.25232E-14	0.54979E-14	0.14796E-13	0.37037E-13
7	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13
8	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13
9	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13
10	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13
11	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13
12	0.16534E-14	0.25285E-14	0.55048E-14	0.14805E-13	0.37047E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	1.751	5.596	30.2304	16.7966	88.9268	8.954	11.0732	88.9111	8.948	11.0889
4.000E-07	1.361	3.855	20.5883	11.5479	89.0533	9.001	10.9467	88.9336	8.957	11.0664
6.000E-07	1.239	3.025	13.5739	7.8062	90.8020	9.709	9.1980	90.4661	9.563	9.5339
8.000E-07	1.179	2.515	9.2448	5.5605	92.4662	10.521	7.5338	91.8330	10.193	8.1670
1.000E-06	1.144	2.164	6.5789	4.2221	93.7682	11.293	6.2318	92.7918	10.701	7.2082
2.000E-06	1.072	12.239	15.8925	16.9065	97.3382	14.754	2.6618	94.8965	12.106	5.1035
4.000E-06	1.036	8.212	3.4400	11.5182	99.1413	19.357	0.8587	94.8179	12.044	5.1821
6.000E-06	1.024	4.598	0.3845	6.0454	99.8286	25.914	0.1714	95.1428	12.307	4.8572
8.000E-06	1.018	4.273	0.0578	5.1371	99.9723	33.324	0.0277	95.5588	12.671	4.4412
1.000E-05	1.014	2.798	0.0062	3.0023	99.9954	40.658	0.0046	96.0357	13.133	3.9643
1.500E-05	1.010	8.603	0.0004	6.8640	99.9999	58.064	0.0001	97.0522	14.339	2.9478
2.500E-05	1.006	7.061	0.0003	2.9532	99.9999	93.338	0.0001	98.4547	16.967	1.5453
4.000E-05	1.004	35.060	0.0017	1.6400	99.9999	145.669	0.0001	99.8272	25.881	0.1728

EFFICIENCY - STATED = 93.54 COMPUTED = 93.5382 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 97.9502
MMD OF INLET SIZE DISTRIBUTION = 1.000E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 1.500E+01
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 4.889E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.699E+00
LOG-NORMAL GOODNESS OF FIT = 1.000
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 15.817

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 96.3055
CORRECTED MMD OF EFFLUENT = 1.402E+00
CORRECTED SIGMAP OF EFFLUENT = 5.067E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
CORRECTED PRECIPITATION RATE PARAMETER = 13.42

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.685E+00	5.957E+01	4.874E-01	6.920E-04	4.881E-01	5.350E-02	2.000E-07
4.266E+00	6.495E+01	7.139E-01	7.806E-03	7.217E-01	2.806E-01	4.000E-07
5.057E+00	7.114E+01	7.145E-01	2.609E-02	7.406E-01	6.176E-01	6.000E-07
5.878E+00	7.642E+01	6.515E-01	5.477E-02	7.063E-01	9.685E-01	8.000E-07
6.702E+00	8.074E+01	5.807E-01	9.099E-02	6.717E-01	1.285E+00	1.000E-06
1.077E+01	9.291E+01	2.904E-01	2.664E-01	5.567E-01	1.817E+01	2.000E-06
1.844E+01	9.892E+01	1.079E-01	5.434E-01	6.513E-01	2.159E+01	4.000E-06
2.591E+01	9.983E+01	2.253E-02	6.159E-01	6.384E-01	1.310E+01	6.000E-06
3.332E+01	9.997E+01	3.701E-03	5.888E-01	5.925E-01	1.147E+01	8.000E-06
4.066E+01	1.000E+02	6.127E-04	5.304E-01	5.310E-01	6.736E+00	1.000E-05
5.806E+01	1.000E+02	1.340E-05	3.906E-01	3.906E-01	1.542E+01	1.500E-05
9.334E+01	1.000E+02	1.258E-05	1.960E-01	1.960E-01	6.634E+00	2.500E-05
1.457E+02	1.000E+02	6.488E-05	1.130E-01	1.131E-01	3.684E+00	4.000E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 96.3055 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 1.000E+01 UM INLET SIGMAP = 1.500E+01

OUTLET MMD = 1.402E+00 UM OUTLET SIGMAP = 5.067E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX F

OUTPUT DATA FROM EXAMPLE 6

```
**********************************
*                                *
*        E.P.A. ESP MODEL        *
*                                *
*   T.E.R.L.-R.T.P. AND SO.R.T.  *
*                                *
*      REVISION I,JAN. 1, 1978   *
*                                *
**********************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  1

DATA ON CARD NUMBER   2

LAB ESP: SCA=50FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  1  NX = 10  NY = 10  NITER =  3  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  1

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

DL =  0.01500 GRN/ACF  PL =  10.0000 FT  ETAO = 99.00000 %  DD =  1000.00 KG/M**3  EPS =  5.100E+00
VRATIO =   1.0300  US = 0.000165 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  1.00E+09 OHM-CM

DATA ON CARD NUMBER   6

ASNUCK( 1) = 0.00  AZIGGY( 1) = 0.00  AZNUMS( 1) =  4.0


DATA ON CARD NUMBER   7

ENDPT( 1) =    0.200 UM   ENDPT( 2) =    0.300 UM   ENDPT( 3) =    0.400 UM   ENDPT( 4) =    0.500 UM   ENDPT( 5) =    0.600 UM
```

ENDPT(6) = 0.800 UM ENDPT(7) = 1.000 UM ENDPT(8) = 1.200 UM ENDPT(9) = 1.400 UM ENDPT(10) = 1.800 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 2.200 UM ENDPT(12) = 3.000 UM ENDPT(13) = 4.000 UM ENDPT(14) = 6.000 UM ENDPT(15) = 10.000 UM
ENDPT(16) = 20.000 UM

DATA ON CARD NUMBER 9

PRCU(1) = 0.0000 % PRCU(2) = 0.0002 % PRCU(3) = 0.4002 % PRCU(4) = 1.0002 % PRCU(5) = 2.6672 %
PRCU(6) = 7.6672 % PRCU(7) = 12.6002 % PRCU(8) = 17.3332 % PRCU(9) = 21.3332 % PRCU(10) = 29.3332 %

DATA ON CARD NUMBER 10

PRCU(11) = 36.0002 % PRCU(12) = 46.6672 % PRCU(13) = 57.3342 % PRCU(14) = 68.6672 % PRCU(15) = 80.6672 %
PRCU(16) = 100.0000 %

DATA ON CARD NUMBER 11

NUMSEC = 3 LSECT(1) = 3 LSECT(2) = 3 LSECT(3) = 6

DATA ON CARD NUMBER 12

AS(1) = 6.2500E+00 FT**2 VOS(1) = 4.6000E+04 V TCS(1) = 1.5000E-04 A WLS(1) = 6.2500E+00 FT
ACS(1) = 4.6875E-02 IN BS(1) = 5.0000E+00 IN NWS(1) = 5.0000E+00

DATA ON CARD NUMBER 13

SYS(1) = 2.5000E+00 IN VGS(1) = 5.0000E+02 FT**3/MIN VGASS(1) = 8.0000E+00 FT/SEC TEMPS(1) = 7.6800E+01 F
PS(1) = 1.0000E+00 ATM VISS(1) = 1.8000E-05 KG/M-SEC LINCS(1) = 8.3333E-01 FT

DATA ON CARD NUMBER 14

AS(2) = 6.2500E+00 FT**2 VOS(2) = 4.5800E+04 V TCS(2) = 1.5000E-04 A WLS(2) = 6.2500E+00 FT
ACS(2) = 4.6875E-02 IN BS(2) = 5.0000E+00 IN NWS(2) = 5.0000E+00

DATA ON CARD NUMBER 15

SYS(2) = 2.5000E+00 IN VGS(2) = 5.0000E+02 FT**3/MIN VGASS(2) = 8.0000E+00 FT/SEC TEMPS(2) = 7.6800E+01 F
PS(2) = 1.0000E+00 ATM VISS(2) = 1.8000E-05 KG/M-SEC LINCS(2) = 8.3333E-01 FT

DATA ON CARD NUMBER 16

AS(3) = 1.2500E+01 FT**2 VOS(3) = 4.8400E+04 V TCS(3) = 3.0000E-04 A WLS(3) = 1.2500E+01 FT
ACS(3) = 4.6875E-02 IN RS(3) = 5.0000E+00 IN NWS(3) = 1.0000E+01

DATA ON CARD NUMBER 17

SYS(3) = 2.5000E+00 IN VGS(3) = 5.0000E+02 FT**3/MIN VGASS(3) = 8.0000E+00 FT/SEC TEMPS(3) = 7.6800E+01 F
PS(3) = 1.0000E+00 ATM VISS(3) = 1.8000E-05 KG/M-SEC LINCS(3) = 8.3333E-01 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=50FT2/1000ACFM;J=240NA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 8.124E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2149	3.622E+05	2.8194E+05	2.0385E+13	25.8	7.35E-06	3.861E-06	2.828E-04	3.61E-08	2.58E-04	1
1.1388	3.622E+05	2.7861E+05	2.1748E+13	25.8	6.13E-06	4.013E-06	2.939E-04	5.91E-08	2.58E-04	2
1.0883	3.622E+05	2.7636E+05	2.2756E+13	25.8	5.16E-06	3.501E-06	2.564E-04	6.40E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 8.124E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0558	3.606E+05	2.7387E+05	2.3559E+13	25.8	4.42E-06	2.864E-06	2.098E-04	6.22E-08	2.58E-04	4
1.0354	3.606E+05	2.7293E+05	2.4023E+13	25.8	3.76E-06	2.337E-06	1.712E-04	5.93E-08	2.58E-04	5
1.0225	3.606E+05	2.7234E+05	2.4326E+13	25.8	3.27E-06	1.935E-06	1.417E-04	5.61E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 8.124E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0139	3.496E+05	2.6501E+05	2.5307E+13	25.8	2.92E-06	1.583E-06	1.160E-04	5.14E-08	2.58E-04	7
1.0089	3.496E+05	2.6501E+05	2.5433E+13	25.8	2.64E-06	1.355E-06	9.925E-05	4.84E-08	2.58E-04	8
1.0057	3.496E+05	2.6501E+05	2.5514E+13	25.8	2.45E-06	1.174E-06	8.600E-05	4.56E-08	2.58E-04	9

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1,0036   3,496E+05  2,6501E+05  2,5566E+13    25,8   2,31E-06   1,029E-06   7,534E-05   4,30E-08   2,58E-04      10
1,0023   3,496E+05  2,6501E+05  2,5599E+13    25,8   2,18E-06   9,086E-07   6,655E-05   4,06E-08   2,58E-04      11
1,0015   3,496E+05  2,6501E+05  2,5620E+13    25,8   2,07E-06   8,085E-07   5,921E-05   3,83E-08   2,58E-04      12

EST, EFFICIENCY = 99,00      UNCORRECTED COMPUTED EFFICIENCY = 73,86


INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE


LAB ESP: SCA=50FT2/1000ACFM;J=24UA/FT2


CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS =  0,7625 M

COLLECTION AREA =  5,812E-01 M2        APPLIED VOLTAGE =  4,600E+04 VOLTS       TOTAL CURRENT =  1,500E-04 AMPS
WIRE TO PLATE =  1,270E-01 M           CORONA WIRE RADIUS =  1,191E-03 M        CORONA WIRE LENGTH =  1,906E+00 M
CURRENT/M =  7,869E-05 AMP/M           CURRENT DENSITY =  2,581E-04 AMP/M2      DEPOSIT E FIELD =  2,581E+03 VOLT/M
1/2 WIRE TO WIRE =  6,350E-02 M        GAS FLOW RATE =  2,365E-01 M3/SEC        GAS VELOCITY =  2,440E+00 M/SEC
TEMPERATURE = 297,667 K                PRESSURE =  1,000 ATM                    VISCOSITY =  1,800E-05 KG/M-SEC
ION MOBILITY =  1,798E-04 M2/VOLT-SEC  MEAN THERMAL SPEED =  4,439E+02 M/SEC   PART, PATH PARAM, =  5,708E-08 M
DUST WEIGHT =  8,124E-06 KG/SEC        LENGTH INCR, =0,25416565 M               INPUT EFF,/INCR, = 10,58

ROVRI    ERAVG        EPLT         AFID       CMCD     MMD        WEIGHT     DUST LAYER   J(PART)     J(ION)    INCR, NO,

1,0713   3,622E+05  2,7558E+05  2,3117E+13    25,8   7,30E-06   3,967E-06   2,905E-04   3,96E-08   2,58E-04      1
1,0603   3,622E+05  2,7508E+05  2,3357E+13    25,8   6,10E-06   4,055E-06   2,969E-04   6,13E-08   2,58E-04      2
1,0504   3,622E+05  2,7508E+05  2,3579E+13    25,8   5,15E-06   3,501E-06   2,564E-04   6,50E-08   2,58E-04      3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS =  0,7625 M

COLLECTION AREA =  5,812E-01 M2        APPLIED VOLTAGE =  4,580E+04 VOLTS       TOTAL CURRENT =  1,500E-04 AMPS
WIRE TO PLATE =  1,270E-01 M           CORONA WIRE RADIUS =  1,191E-03 M        CORONA WIRE LENGTH =  1,906E+00 M
CURRENT/M =  7,869E-05 AMP/M           CURRENT DENSITY =  2,581E-04 AMP/M2      DEPOSIT E FIELD =  2,581E+03 VOLT/M
1/2 WIRE TO WIRE =  6,350E-02 M        GAS FLOW RATE =  2,365E-01 M3/SEC        GAS VELOCITY =  2,440E+00 M/SEC
TEMPERATURE = 297,667 K                PRESSURE =  1,000 ATM                    VISCOSITY =  1,800E-05 KG/M-SEC
ION MOBILITY =  1,798E-04 M2/VOLT-SEC  MEAN THERMAL SPEED =  4,439E+02 M/SEC   PART, PATH PARAM, =  5,708E-08 M
DUST WEIGHT =  8,124E-06 KG/SEC        LENGTH INCR, =0,25416565 M               INPUT EFF,/INCR, = 10,58

ROVRI    ERAVG        EPLT         AFID       CMCD     MMD        WEIGHT     DUST LAYER   J(PART)     J(ION)    INCR, NO,

1,0417   3,606E+05  2,7323E+05  2,3877E+13    25,8   4,39E-06   2,844E-06   2,083E-04   6,27E-08   2,58E-04      4
1,0348   3,606E+05  2,7323E+05  2,4038E+13    25,8   3,72E-06   2,324E-06   1,702E-04   5,97E-08   2,58E-04      5
1,0290   3,606E+05  2,7323E+05  2,4172E+13    25,8   3,24E-06   1,926E-06   1,411E-04   5,65E-08   2,58E-04      6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS =  1,5250 M

COLLECTION AREA =  1,162E+00 M2        APPLIED VOLTAGE =  4,440E+04 VOLTS       TOTAL CURRENT =  3,000E-04 AMPS
WIRE TO PLATE =  1,270E-01 M           CORONA WIRE RADIUS =  1,191E-03 M        CORONA WIRE LENGTH =  3,812E+00 M
CURRENT/M =  7,869E-05 AMP/M           CURRENT DENSITY =  2,581E-04 AMP/M2      DEPOSIT E FIELD =  2,581E+03 VOLT/M
1/2 WIRE TO WIRE =  6,350E-02 M        GAS FLOW RATE =  2,365E-01 M3/SEC        GAS VELOCITY =  2,440E+00 M/SEC
TEMPERATURE = 297,667 K                PRESSURE =  1,000 ATM                    VISCOSITY =  1,800E-05 KG/M-SEC
ION MOBILITY =  1,798E-04 M2/VOLT-SEC  MEAN THERMAL SPEED =  4,439E+02 M/SEC   PART, PATH PARAM, =  5,708E-08 M
DUST WEIGHT =  8,124E-06 KG/SEC        LENGTH INCR, =0,25416565 M               INPUT EFF,/INCR, = 10,58

ROVRI    ERAVG        EPLT         AFID       CMCD     MMD        WEIGHT     DUST LAYER   J(PART)     J(ION)    INCR, NO,
```

1.0235	3.496E+05	2.6544E+05	2.5069E+13	25.8	2.90E-06	1.573E-06	1.152E-04	5.15E-08	2.58E-04	7
1.0197	3.496E+05	2.6544E+05	2.5163E+13	25.8	2.62E-06	1.346E-06	9.857E-05	4.85E-08	2.58E-04	8
1.0165	3.496E+05	2.6544E+05	2.5242E+13	25.8	2.44E-06	1.166E-06	8.543E-05	4.56E-08	2.58E-04	9
1.0139	3.496E+05	2.6544E+05	2.5308E+13	25.8	2.30E-06	1.022E-06	7.485E-05	4.30E-08	2.58E-04	10
1.0116	3.496E+05	2.6544E+05	2.5363E+13	25.8	2.17E-06	9.028E-07	6.612E-05	4.05E-08	2.58E-04	11
1.0098	3.496E+05	2.6544E+05	2.5410E+13	25.8	2.06E-06	8.029E-07	5.880E-05	3.82E-08	2.58E-04	12

EST. EFFICIENCY = 73.86 UNCORRECTED COMPUTED EFFICIENCY = 74.03

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=50FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 8.124E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0717	3.622E+05	2.7559E+05	2.3110E+13	25.8	7.30E-06	3.966E-06	2.905E-04	3.96E-08	2.58E-04	1
1.0606	3.622E+05	2.7509E+05	2.3351E+13	25.8	6.10E-06	4.054E-06	2.969E-04	6.13E-08	2.58E-04	2
1.0505	3.622E+05	2.7457E+05	2.3575E+13	25.8	5.15E-06	3.495E-06	2.560E-04	6.48E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 8.124E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0419	3.606E+05	2.7324E+05	2.3874E+13	25.8	4.39E-06	2.845E-06	2.084E-04	6.27E-08	2.58E-04	4
1.0349	3.606E+05	2.7324E+05	2.4036E+13	25.8	3.72E-06	2.325E-06	1.703E-04	5.97E-08	2.58E-04	5
1.0291	3.606E+05	2.7324E+05	2.4171E+13	25.8	3.24E-06	1.927E-06	1.411E-04	5.65E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.365E-01 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.440E+00 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M

DUST WEIGHT = 8.124E-06 KG/SEC LENGTH INCR. =0.2541656S M INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0235	3.496E+05	2.6544E+05	2.5068E+13	25.8	2.90E-06	1.574F-06	1.153E-04	5.15E-08	2.58E-04	7
1.0197	3.496E+05	2.6544E+05	2.5163E+13	25.8	2.62E-06	1.346F-06	9.859E-05	4.85E-08	2.58E-04	8
1.0165	3.496E+05	2.6544E+05	2.5242E+13	25.8	2.44E-06	1.167F-06	8.545E-05	4.56E-08	2.58E-04	9
1.0139	3.496E+05	2.6544E+05	2.5308E+13	25.8	2.30E-06	1.022E-06	7.487E-05	4.30E-08	2.58E-04	10
1.0116	3.496E+05	2.6544E+05	2.5364E+13	25.8	2.17E-06	9.030F-07	6.614E-05	4.05E-08	2.58E-04	11
1.0098	3.496E+05	2.6544E+05	2.5410E+13	25.8	2.06E-06	8.031F-07	5.882E-05	3.82E-08	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSAT FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	0.9969	0.9648	0.9393
2	1.4244	1.4197	1.4000	1.3780	1.3475	1.3040	1.2693	1.2413
3	1.6074	1.5872	1.5516	1.5160	1.4692	1.4143	1.3719	1.3383
4	1.7256	1.6925	1.6453	1.6002	1.5425	1.4790	1.4304	1.3923
5	1.8129	1.7693	1.7132	1.6610	1.5953	1.5250	1.4717	1.4300
6	1.8818	1.8295	1.7662	1.7084	1.6362	1.5605	1.5033	1.4588
7	1.9360	1.8756	1.8058	1.7430	1.6653	1.5848	1.5243	1.4773
8	1.9823	1.9149	1.8397	1.7727	1.6903	1.6057	1.5424	1.4932
9	2.0228	1.9492	1.8692	1.7986	1.7122	1.6240	1.5582	1.5072
10	2.0586	1.9796	1.8954	1.8216	1.7317	1.6403	1.5723	1.5197
11	2.0908	2.0069	1.9190	1.8422	1.7491	1.6550	1.5850	1.5309
12	2.1199	2.0316	1.9403	1.8610	1.7650	1.6683	1.5965	1.5411

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.9096	0.8806	0.8505	0.8215	0.7931	0.7641	0.7369
2	1.2081	1.1743	1.1371	1.0965	1.0444	0.9744	0.9141
3	1.2993	1.2610	1.2206	1.1805	1.1391	1.0920	1.0214
4	1.3483	1.3054	1.2605	1.2165	1.1721	1.1248	1.0742
5	1.3821	1.3355	1.2870	1.2397	1.1923	1.1426	1.0926
6	1.4077	1.3581	1.3067	1.2566	1.2067	1.1546	1.1033
7	1.4234	1.3713	1.3173	1.2649	1.2127	1.1585	1.1055
8	1.4370	1.3827	1.3265	1.2721	1.2127	1.1585	1.1055
9	1.4490	1.3928	1.3347	1.2785	1.2127	1.1585	1.1055
10	1.4596	1.4018	1.3420	1.2843	1.2127	1.1585	1.1055
11	1.4693	1.4099	1.3487	1.2843	1.2127	1.1585	1.1055
12	1.4780	1.4173	1.3487	1.2843	1.2127	1.1585	1.1055

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.18551E-16	0.26469E-16	0.35679E-16
2	0.25979E-17	0.45785E-17	0.70759E-17	0.10077E-16	0.15507E-16	0.24266E-16	0.34824E-16	0.47152E-16
3	0.29317E-17	0.51188E-17	0.78422E-17	0.11086E-16	0.16907E-16	0.26319E-16	0.37638E-16	0.50838E-16
4	0.31472E-17	0.54584E-17	0.83158E-17	0.11702E-16	0.17751E-16	0.27522E-16	0.39244E-16	0.52889E-16
5	0.33064E-17	0.57060E-17	0.86588E-17	0.12147E-16	0.18358E-16	0.28378E-16	0.40375E-16	0.54320E-16
6	0.34322E-17	0.59003E-17	0.89269E-17	0.12493E-16	0.18829E-16	0.29039E-16	0.41244E-16	0.55414E-16
7	0.35309E-17	0.60488E-17	0.91270E-17	0.12747E-16	0.19164E-16	0.29492E-16	0.41819E-16	0.56116E-16
8	0.36154E-17	0.61757E-17	0.92982E-17	0.12963E-16	0.19452E-16	0.29881E-16	0.42314E-16	0.56721E-16
9	0.36892E-17	0.62863E-17	0.94475E-17	0.13153E-16	0.19704E-16	0.30222E-16	0.42749E-16	0.57252E-16
10	0.37545E-17	0.63844E-17	0.95800E-17	0.13321E-16	0.19927E-16	0.30525E-16	0.43136E-16	0.57726E-16
11	0.38132E-17	0.64724E-17	0.96988E-17	0.13472E-16	0.20128E-16	0.30798E-16	0.43484E-16	0.58152E-16
12	0.38664E-17	0.65521E-17	0.98065E-17	0.13609E-16	0.20311E-16	0.31045E-16	0.43800E-16	0.58540E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.51890E-16	0.77934E-16	0.12641E-15	0.22012E-15	0.43179E-15	0.10612E-14	0.35878E-14
2	0.68916E-16	0.10393E-15	0.16900E-15	0.29380E-15	0.56866E-15	0.13532E-14	0.44510E-14
3	0.74124E-16	0.11160E-15	0.18142E-15	0.31632E-15	0.62023E-15	0.15166E-14	0.49731E-14
4	0.76918E-16	0.11553E-15	0.18735E-15	0.32596E-15	0.63819E-15	0.15620E-14	0.52301E-14
5	0.78844E-16	0.11819E-15	0.19128E-15	0.33216E-15	0.64917E-15	0.15868E-14	0.53197E-14
6	0.80306E-16	0.12020E-15	0.19421E-15	0.33670E-15	0.65699E-15	0.16035E-14	0.53721E-14
7	0.81202E-16	0.12136E-15	0.19579E-15	0.33892E-15	0.66028E-15	0.16090E-14	0.53826E-14
8	0.81978E-16	0.12237E-15	0.19716E-15	0.34086E-15	0.66028E-15	0.16090E-14	0.53826E-14
9	0.82660E-16	0.12326E-15	0.19838E-15	0.34258E-15	0.66028E-15	0.16090E-14	0.53826E-14
10	0.83269E-16	0.12406E-15	0.19947E-15	0.34413E-15	0.66028E-15	0.16090E-14	0.53826E-14
11	0.83818E-16	0.12478E-15	0.20046E-15	0.34413E-15	0.66028E-15	0.16090E-14	0.53826E-14
12	0.84317E-16	0.12543E-15	0.20046E-15	0.34413E-15	0.66028E-15	0.16090E-14	0.53826E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0005	0.0004	53.2757	7.740	46.7243	53.2757	7.740	46.7243
3.500E-07	1.414	0.400	0.9821	0.8580	53.9575	7.889	46.0425	53.1700	7.717	46.8300
4.500E-07	1.320	0.600	1.4296	1.2530	55.3206	8.195	44.6794	54.4045	7.989	45.5955
5.500E-07	1.261	1.667	3.8149	3.3139	57.0864	8.605	42.9136	56.5980	8.490	43.4020
7.000E-07	1.205	5.000	10.8086	9.3959	59.4630	9.185	40.5370	58.9728	9.063	41.0272
9.000E-07	1.159	4.933	9.8738	8.6406	62.4658	9.968	37.5342	61.7583	9.778	38.2417
1.100E-06	1.130	4.733	8.8214	7.7778	65.0493	10.693	34.9507	64.1222	10.427	35.8778
1.300E-06	1.110	4.000	6.9537	6.2071	67.4005	11.402	32.5995	66.1206	11.010	33.8794
1.600E-06	1.090	8.000	12.6903	11.4406	70.2536	12.333	29.7464	68.7777	11.841	31.2223
2.000E-06	1.072	6.667	9.4352	8.7016	73.4616	13.494	26.5384	71.5046	12.770	28.4954
2.600E-06	1.055	10.667	12.9224	12.3401	77.2828	15.075	22.7172	74.7430	13.997	25.2570
3.500E-06	1.041	10.667	10.6603	10.6295	81.2595	17.033	18.7405	78.2442	15.515	21.7558
5.000E-06	1.029	11.333	8.0532	9.3297	86.6747	20.502	13.3253	82.0266	17.458	17.9734
8.000E-06	1.018	12.000	3.0709	5.6215	95.2011	30.890	4.7989	89.7722	23.193	10.2278
1.500E-05	1.010	19.333	0.4830	4.4902	99.5315	54.557	0.4685	94.9291	30.330	5.0709

EFFICIENCY = STATED = 74.03 COMPUTED = 74.0259 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 81.2478
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.750E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.775E+00
LOG-NORMAL GOODNESS OF FIT = 0.959
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 17.027

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 78.1674
CORRECTED MMD OF EFFLUENT = 2.144E+00
CORRECTED SIGMAP OF EFFLUENT = 1.963E+00
LOG-NORMAL GOODNESS OF FIT = 0.948
CORRECTED PRECIPITATION RATE PARAMETER = 15.48

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.329E+00	2.791E+01	1.991E-04	2.863E-03	3.062E-03	4.360E-02	2.500E-07
3.636E+00	3.005E+01	5.532E-01	9.461E-03	5.626E-01	1.022E-01	3.500E-07
3.998E+00	3.250E+01	1.03AE+00	2.128E-02	1.059E+00	1.784E-01	4.500E-07
4.379E+00	3.498E+01	3.390E+00	3.858E-02	3.429E+00	2.642E-01	5.500E-07
4.965E+00	3.862E+01	6.08AE+00	7.361E-02	6.161E+00	7.953E-01	7.000E-07
5.729E+00	4.306E+01	7.170E+00	1.351E-01	7.305E+00	1.132E+00	9.000E-07
6.489E+00	4.716E+01	7.840E+00	2.079E-01	8.048E+00	1.424E+00	1.100E-06
7.244E+00	5.094E+01	7.309E+00	2.869E-01	7.596E+00	1.661E+00	1.300E-06
8.367E+00	5.607E+01	A.182E+00	4.059E-01	8.588E+00	3.831E+00	1.600E-06
9.850E+00	6.203E+01	7.61AE+00	5.61AE-01	8.180E+00	4.234E+00	2.000E-06
1.204E+01	6.939E+01	6.751E+00	7.548E-01	7.506E+00	8.791E+00	2.600E-06
1.528E+01	7.773E+01	6.004E+00	9.661E-01	6.970E+00	1.044E+01	3.500E-06
2.050E+01	8.667E+01	3.218E+00	1.123E+00	4.341E+00	1.709E+01	5.000E-06
3.089E+01	9.520E+01	9.741E-01	1.102E+00	2.076E+00	2.114E+01	8.000E-06
5.456E+01	9.953E+01	1.129E-01	1.109E+00	1.222E+00	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 78.1674 % SCA = 9.831E+00 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V
AVG. CURRENT DENSITY = 25.81 NA/CM**2
RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00
OUTLET MMD = 2.144E+00 UM OUTLET SIGMAP = 1.963E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*        REVISION 1,JAN. 1, 1978     *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 16 NDATA = 3

DATA ON CARD NUMBER 2

LAB ESP: SCA=200FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER 3

VGS(1) = 1.2500E+02 FT**3/MIN VGASS(1) = 2.0000E+00 FT/SEC

VGS(2) = 1.2500E+02 FT**3/MIN VGASS(2) = 2.0000E+00 FT/SEC

VGS(3) = 1.2500E+02 FT**3/MIN VGASS(3) = 2.0000E+00 FT/SEC

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=200FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0179	3.622E+05	2.7305E+05	2.4330E+13	25.8	6.19E-06	1.415E-05	2.592E-04	4.60E-08	2.58E-04	1
1.0126	3.622E+05	2.7305E+05	2.4457E+13	25.8	3.04E-06	7.128E-06	1.305E-04	5.45E-08	2.58E-04	2
1.0087	3.622E+05	2.7305E+05	2.4554E+13	25.8	2.21E-06	4.029E-06	7.378E-05	4.42E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0060	3.606E+05	2.7156E+05	2.4727E+13	25.8	1.79E-06	2.559E-06	4.685E-05	3.50E-08	2.58E-04	4
1.0042	3.606E+05	2.7156E+05	2.4771E+13	25.8	1.54E-06	1.737E-06	3.180E-05	2.79E-08	2.58E-04	5
1.0029	3.606E+05	2.7156E+05	2.4802E+13	25.8	1.40E-06	1.220E-06	2.234E-05	2.22E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0020	3.496E+05	2.6446E+05	2.5608E+13	25.8	1.28E-06	8.552E-07	1.566E-05	1.73E-08	2.58E-04	7
1.0014	3.496E+05	2.6446E+05	2.5622E+13	25.8	1.17E-06	6.296E-07	1.153E-05	1.39E-08	2.58E-04	8
1.0010	3.496E+05	2.6446E+05	2.5633E+13	25.8	1.08E-06	4.677E-07	8.601E-06	1.12E-08	2.58E-04	9

1.0007	3.496E+05	2.6446E+05	2.5640F+13	25.8	1.01E-06	3.544F-07	6.489E-06	8.99E-09	2.58E-04	10
1.0005	3.496E+05	2.6446E+05	2.5645E+13	25.8	9.57E-07	2.696F-07	4.937E-06	7.26E-09	2.58E-04	11
1.0004	3.496E+05	2.6446E+05	2.5649E+13	25.8	9.07E-07	2.067E-07	3.785E-06	5.88E-09	2.58E-04	12

EST. EFFICIENCY = 74.03 UNCORRECTED COMPUTED EFFICIENCY = 97.85

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=200FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0462	3.622E+05	2.7437E+05	2.3673E+13	25.8	6.18E-06	1.419E-05	2.599E-04	4.62E-08	2.58E-04	1
1.0264	3.622E+05	2.7345E+05	2.4129E+13	25.8	3.03E-06	7.110E-06	1.302E-04	5.44E-08	2.58E-04	2
1.0147	3.622E+05	2.7286E+05	2.4407E+13	25.8	2.21E-06	4.016E-06	7.352E-05	4.41E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0082	3.606E+05	2.7167E+05	2.4671E+13	25.8	1.79E-06	2.555E-06	4.678E-05	3.50E-08	2.58E-04	4
1.0047	3.606E+05	2.7167E+05	2.4759E+13	25.8	1.56E-06	1.735E-06	3.177E-05	2.79E-08	2.58E-04	5
1.0027	3.606E+05	2.7167E+05	2.4808E+13	25.8	1.40E-06	1.219E-06	2.232E-05	2.22E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270F-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 2.031E-06 KG/SEC

APPLIED VOLTAGE = 4.440F+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 5.912E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 6.100E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0015	3.496E+05	2.6444E+05	2.5621E+13	25.8	1.28E-06	8.543E-07	1.564E-05	1.73E-08	2.58E-04	7
1.0008	3.496E+05	2.6444E+05	2.5637E+13	25.8	1.17E-06	6.291E-07	1.152E-05	1.38E-08	2.58E-04	8
1.0005	3.496E+05	2.6444E+05	2.5646E+13	25.8	1.08E-06	4.694E-07	8.595E-06	1.11E-08	2.58E-04	9
1.0003	3.496E+05	2.6444E+05	2.5651E+13	25.8	1.01E-06	3.542E-07	6.485E-06	8.99E-09	2.58E-04	10
1.0002	3.496E+05	2.6444E+05	2.5654E+13	25.8	9.57E-07	2.695E-07	4.935E-06	7.26E-09	2.58E-04	11
1.0001	3.496E+05	2.6444E+05	2.5656E+13	25.8	9.07E-07	2.066E-07	3.784E-06	5.88E-09	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.8199	1.7759	1.7194	1.6669	1.6007	1.5326	1.4810	1.4407
3	2.0353	1.9631	1.8839	1.8136	1.7275	1.6409	1.5761	1.5259
4	2.1616	2.0714	1.9781	1.8971	1.7991	1.7015	1.6290	1.5730
5	2.2511	2.1478	2.0444	1.9558	1.8494	1.7440	1.6661	1.6060
6	2.3202	2.2066	2.0955	2.0010	1.8881	1.7767	1.6946	1.6314
7	2.3730	2.2504	2.1325	2.0330	1.9147	1.7983	1.7128	1.6471
8	2.4179	2.2876	2.1641	2.0604	1.9375	1.8170	1.7286	1.6608
9	2.4568	2.3200	2.1917	2.0844	1.9575	1.8334	1.7425	1.6729
10	2.4912	2.3486	2.2161	2.1056	1.9753	1.8480	1.7549	1.6837
11	2.5220	2.3743	2.2380	2.1246	1.9912	1.8612	1.7661	1.6935
12	2.5498	2.3975	2.2578	2.1419	2.0058	1.8732	1.7764	1.7024

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.3942	1.3489	1.3018	1.2559	1.2100	1.1623	1.1160
3	1.4685	1.4130	1.3556	1.3000	1.2449	1.1879	1.1330
4	1.5092	1.4478	1.3845	1.3234	1.2630	1.2008	1.1411
5	1.5378	1.4723	1.4049	1.3400	1.2758	1.2100	1.1470
6	1.5598	1.4911	1.4205	1.3527	1.2857	1.2172	1.1516
7	1.5728	1.5016	1.4286	1.3585	1.2896	1.2193	1.1516
8	1.5841	1.5108	1.4358	1.3585	1.2896	1.2193	1.1516
9	1.5942	1.5190	1.4358	1.3585	1.2896	1.2193	1.1516
10	1.6033	1.5265	1.4358	1.3585	1.2896	1.2193	1.1516
11	1.6115	1.5265	1.4358	1.3585	1.2896	1.2193	1.1516
12	1.6190	1.5265	1.4358	1.3585	1.2896	1.2193	1.1516

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.33192E-17	0.57274E-17	0.86902E-17	0.12190E-16	0.18420E-16	0.28521E-16	0.40632E-16	0.54725E-16
3	0.37121E-17	0.63313E-17	0.95215E-17	0.13263E-16	0.19880E-16	0.30535E-16	0.43240E-16	0.57961E-16
4	0.39423E-17	0.66803E-17	0.99976E-17	0.13873E-16	0.20704E-16	0.31662E-16	0.44690E-16	0.59750E-16
5	0.41055E-17	0.69266E-17	0.10333E-16	0.14303E-16	0.21283E-16	0.32454E-16	0.45708E-16	0.61006E-16
6	0.42317E-17	0.71166E-17	0.10591E-16	0.14633E-16	0.21728E-16	0.33062E-16	0.46490E-16	0.61971E-16
7	0.43280E-17	0.72576E-17	0.10778E-16	0.14867E-16	0.22034E-16	0.33465E-16	0.46990E-16	0.62568E-16
8	0.44097E-17	0.73777E-17	0.10938E-16	0.15068E-16	0.22296E-16	0.33813E-16	0.47423E-16	0.63087E-16
9	0.44807E-17	0.74822E-17	0.11077E-16	0.15243E-16	0.22526E-16	0.34118E-16	0.47804E-16	0.63546E-16
10	0.45435E-17	0.75745E-17	0.11200E-16	0.15398E-16	0.22731E-16	0.34390E-16	0.48146E-16	0.63957E-16
11	0.45996E-17	0.76573E-17	0.11311E-16	0.15537E-16	0.22915E-16	0.34635E-16	0.48454E-16	0.64329E-16
12	0.46504E-17	0.77322E-17	0.11411E-16	0.15663E-16	0.23082E-16	0.34858E-16	0.48734E-16	0.64668E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.50445E-14
2	0.79535E-16	0.11938E-15	0.19349E-15	0.33651E-15	0.65879E-15	0.16141E-14	0.54338E-14
3	0.83772E-16	0.12505E-15	0.20148E-15	0.34834E-15	0.67779E-15	0.16498E-14	0.55167E-14
4	0.86096E-16	0.12813E-15	0.20578E-15	0.35461E-15	0.68767E-15	0.16677E-14	0.55562E-14
5	0.87729E-16	0.13030E-15	0.20881E-15	0.35904E-15	0.69466E-15	0.16805E-14	0.55848E-14
6	0.88982E-16	0.13196E-15	0.21113E-15	0.36244E-15	0.70004E-15	0.16904E-14	0.56071E-14
7	0.89723E-16	0.13289E-15	0.21233E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14
8	0.90371E-16	0.13371E-15	0.21340E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14
9	0.90946E-16	0.13444E-15	0.21340E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14
10	0.91463E-16	0.13510E-15	0.21340E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14
11	0.91932E-16	0.13510E-15	0.21340E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14
12	0.92361E-16	0.13510E-15	0.21340E-15	0.36401E-15	0.70216E-15	0.16933E-14	0.56071E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0014	0.0004	97.5047	9.386	2.4953	97.5047	9.386	2.4953
3.500E-07	1.414	0.400	2.8574	0.9386	97.4939	9.375	2.5061	97.2881	9.174	2.7119
4.500E-07	1.320	0.600	3.9412	1.3207	97.6956	9.588	2.3044	97.4562	9.337	2.5438
5.500E-07	1.261	1.667	9.5133	3.0719	97.9979	9.946	2.0021	97.8703	9.789	2.1297
7.000E-07	1.205	5.000	23.2591	7.6146	98.3681	10.465	1.6319	98.2400	10.273	1.7600
9.000E-07	1.159	4.933	16.9031	5.9202	98.7979	11.243	1.2021	98.6130	10.879	1.3870
1.100E-06	1.130	4.733	12.1630	4.6843	99.0985	11.975	0.9015	98.8562	11.369	1.1438
1.300E-06	1.110	4.000	7.7344	3.5053	99.3217	12.698	0.6783	98.9872	11.679	1.0128
1.600E-06	1.090	8.000	10.6369	5.8983	99.5335	13.650	0.4665	99.1479	12.118	0.8521
2.000E-06	1.072	6.667	5.5754	4.6423	99.7066	14.829	0.2934	99.1953	12.263	0.8047
2.600E-06	1.055	10.667	4.7462	7.5662	99.8439	16.434	0.1561	99.1803	12.216	0.8197
3.500E-06	1.041	10.667	2.1404	7.9221	99.9296	18.459	0.0704	99.1417	12.100	0.8583
5.000E-06	1.029	11.333	0.5162	12.0667	99.9840	22.230	0.0160	98.7695	11.184	1.2305
8.000E-06	1.018	12.000	0.0063	14.7313	99.9998	33.585	0.0002	98.5813	10.822	1.4187
1.500E-05	1.010	19.333	0.0055	20.1172	99.9999	58.826	0.0001	98.7974	11.242	1.2026

EFFICIENCY = STATED = 97.85 COMPUTED = 97.8519 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6492
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.067E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.538E+00
LOG-NORMAL GOODNESS OF FIT = 0.960
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.375

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 98.8443
CORRECTED MMD OF EFFLUENT = 3.221E+00
CORRECTED SIGMAP OF EFFLUENT = 2.360E+00
LOG-NORMAL GOODNESS OF FIT = 0.905
CORRECTED PRECIPITATION RATE PARAMETER = 11.34

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.037E+00	7.955E+01	1.064E-05	7.482E-04	7.588E-04	4.360E-02	2.500E-07
4.320E+00	8.171E+01	3.011E-02	2.472E-03	3.25AE-02	1.022E-01	3.500E-07
4.677E+00	8.411E+01	5.354E-02	5.561E-03	5.910E-02	1.784E-01	4.500E-07
5.061E+00	8.633E+01	1.582E-01	1.008E-02	1.683E-01	2.642E-01	5.500E-07
5.657E+00	8.919E+01	2.451E-01	1.923E-02	2.643E-01	7.953E-01	7.000E-07
6.461E+00	9.212E+01	2.296E-01	3.531E-02	2.649E-01	1.132E+00	9.000E-07
7.266E+00	9.426E+01	2.022E-01	5.434E-02	2.566E-01	1.424E+00	1.100E-06
8.067E+00	9.581E+01	1.521E-01	7.498E-02	2.271E-01	1.661E+00	1.300E-06
9.261E+00	9.738E+01	1.283E-01	1.061E-01	2.344E-01	3.831E+00	1.600E-06
1.082E+01	9.858E+01	8.422E-02	1.468E-01	2.310E-01	4.234E+00	2.000E-06
1.313E+01	9.943E+01	4.639E-02	1.972E-01	2.436E-01	8.791E+00	2.600E-06
1.656E+01	9.985E+01	2.255E-02	2.524E-01	2.750E-01	1.044E+01	3.500E-06
2.223E+01	9.998E+01	3.859E-03	2.933E-01	2.972E-01	1.709E+01	5.000E-06
3.359E+01	1.000E+02	3.717E-05	2.879E-01	2.880E-01	2.114E+01	8.000E-06
5.883E+01	1.000E+02	2.390E-05	2.898E-01	2.898E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 98.8443 % SCA = 3.932E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 3.221E+00 UM OUTLET SIGMAP = 2.360E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  3

DATA ON CARD NUMBER   2

LAB ESP: SCA=300FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER   3

VGS( 1) =  8.3333E+01 FT**3/MIN  VGASS( 1) =  1.3333E+00 FT/SEC
VGS( 2) =  8.3333E+01 FT**3/MIN  VGASS( 2) =  1.3333E+00 FT/SEC
VGS( 3) =  8.3333E+01 FT**3/MIN  VGASS( 3) =  1.3333E+00 FT/SEC
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=300FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2 | APPLIED VOLTAGE = 4.600E+04 VOLTS | TOTAL CURRENT = 1.500E-04 AMPS
WIRE TO PLATE = 1.270E-01 M | CORONA WIRE RADIUS = 1.191E-03 M | CORONA WIRE LENGTH = 1.906E+00 M
CURRENT/M = 7.869E-05 AMP/M | CURRENT DENSITY = 2.581E-04 AMP/M2 | DEPOSIT E FIELD = 2.581E+03 VOLT/M
1/2 WIRE TO WIRE = 6.350E-02 M | GAS FLOW RATE = 3.942E-02 M3/SEC | GAS VELOCITY = 4.067E-01 M/SEC
TEMPERATURE = 297.667 K | PRESSURE = 1.000 ATM | VISCOSITY = 1.800E-05 KG/M-SEC
ION MOBILITY = 1.798E-04 M2/VOLT-SEC | MEAN THERMAL SPEED = 4.439E+02 M/SEC | PART. PATH PARAM. = 5.708E-08 M
DUST WEIGHT = 1.354E-06 KG/SEC | LENGTH INCR. =0.25416565 M | INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0308	3.622E+05	2.7365E+05	2.4026E+13	25.8	5.47E-06	1.770E-05	2.161E-04	4.18E-08	2.58E-04	1
1.0159	3.622E+05	2.7291E+05	2.4378E+13	25.8	2.41E-06	7.254E-06	8.855E-05	4.74E-08	2.58E-04	2
1.0079	3.622E+05	2.7291E+05	2.4573E+13	25.8	1.74E-06	3.657E-06	4.463E-05	3.42E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2 | APPLIED VOLTAGE = 4.580E+04 VOLTS | TOTAL CURRENT = 1.500E-04 AMPS
WIRE TO PLATE = 1.270E-01 M | CORONA WIRE RADIUS = 1.191E-03 M | CORONA WIRE LENGTH = 1.906E+00 M
CURRENT/M = 7.869E-05 AMP/M | CURRENT DENSITY = 2.581E-04 AMP/M2 | DEPOSIT E FIELD = 2.581E+03 VOLT/M
1/2 WIRE TO WIRE = 6.350E-02 M | GAS FLOW RATE = 3.942E-02 M3/SEC | GAS VELOCITY = 4.067E-01 M/SEC
TEMPERATURE = 297.667 K | PRESSURE = 1.000 ATM | VISCOSITY = 1.800E-05 KG/M-SEC
ION MOBILITY = 1.798E-04 M2/VOLT-SEC | MEAN THERMAL SPEED = 4.439E+02 M/SEC | PART. PATH PARAM. = 5.708E-08 M
DUST WEIGHT = 1.354E-06 KG/SEC | LENGTH INCR. =0.25416565 M | INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0039	3.606E+05	2.7141E+05	2.4777E+13	25.8	1.44E-06	2.082E-06	2.541E-05	2.43E-08	2.58E-04	4
1.0020	3.606E+05	2.7141E+05	2.4825E+13	25.8	1.26E-06	1.267E-06	1.546E-05	1.74E-08	2.58E-04	5
1.0010	3.606E+05	2.7141E+05	2.4849E+13	25.8	1.10E-06	7.998E-07	9.763E-06	1.24E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2 | APPLIED VOLTAGE = 4.440E+04 VOLTS | TOTAL CURRENT = 3.000E-04 AMPS
WIRE TO PLATE = 1.270E-01 M | CORONA WIRE RADIUS = 1.191E-03 M | CORONA WIRE LENGTH = 3.812E+00 M
CURRENT/M = 7.869E-05 AMP/M | CURRENT DENSITY = 2.581E-04 AMP/M2 | DEPOSIT E FIELD = 2.581E+03 VOLT/M
1/2 WIRE TO WIRE = 6.350E-02 M | GAS FLOW RATE = 3.942E-02 M3/SEC | GAS VELOCITY = 4.067E-01 M/SEC
TEMPERATURE = 297.667 K | PRESSURE = 1.000 ATM | VISCOSITY = 1.800E-05 KG/M-SEC
ION MOBILITY = 1.798E-04 M2/VOLT-SEC | MEAN THERMAL SPEED = 4.439E+02 M/SEC | PART. PATH PARAM. = 5.708E-08 M
DUST WEIGHT = 1.354E-06 KG/SEC | LENGTH INCR. =0.25416565 M | INPUT EFF./INCR. = 27.39

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0005	3.496E+05	2.6440E+05	2.5646E+13	25.8	9.99E-07	5.061E-07	6.177E-06	8.72E-09	2.58E-04	7
1.0003	3.496E+05	2.6440E+05	2.5652E+13	25.8	9.18E-07	3.373E-07	4.117E-06	6.33E-09	2.58E-04	8
1.0001	3.496E+05	2.6440E+05	2.5655E+13	25.8	8.60E-07	2.281E-07	2.784E-06	4.61E-09	2.58E-04	9

1.0001	3.496E+05	2.6440E+05	2.5657E+13	25.8	8.13E-07	1.560E-07	1.905E-06	3.37E-09	2.58E-04	10
1.0000	3.496E+05	2.6440E+05	2.5658E+13	25.8	7.73E-07	1.077E-07	1.315E-06	2.46E-09	2.58E-04	11
1.0000	3.496E+05	2.6440E+05	2.5658E+13	25.8	7.36E-07	7.488E-08	9.140E-07	1.80E-09	2.58E-04	12

EST. EFFICIENCY = 97.85 UNCORRECTED COMPUTED EFFICIENCY = 99.48

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=300FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.354E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 3.942E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 4.067E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0398	3.622E+05	2.7408E+05	2.3817E+13	25.8	5.47E-06	1.771E-05	2.162E-04	4.19E-08	2.58E-04	1
1.0183	3.622E+05	2.7307E+05	2.4321E+13	25.8	2.41E-06	7.248E-06	8.847E-05	4.73E-08	2.58E-04	2
1.0080	3.622E+05	2.7255E+05	2.4569E+13	25.8	1.74E-06	3.649E-06	4.454E-05	3.41E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.354E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 3.942E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 4.067E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0036	3.606E+05	2.7140E+05	2.4786E+13	25.8	1.44E-06	2.081E-06	2.540E-05	2.43E-08	2.58E-04	4
1.0016	3.606E+05	2.7140E+05	2.4834E+13	25.8	1.26E-06	1.267E-06	1.546E-05	1.74E-08	2.58E-04	5
1.0007	3.606E+05	2.7140E+05	2.4856E+13	25.8	1.10E-06	7.998E-07	9.763E-06	1.24E-08	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.354E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 3.942E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 4.067E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0003	3.496E+05	2.6439E+05	2.5650E+13	25.8	9.99E-07	5.061E-07	6.178E-06	8.72E-09	2.58E-04	7
1.0001	3.496E+05	2.6439E+05	2.5655E+13	25.8	9.18E-07	3.373E-07	4.117E-06	6.33E-09	2.58E-04	8
1.0001	3.496E+05	2.6439E+05	2.5657E+13	25.8	8.60E-07	2.281E-07	2.784E-06	4.61E-09	2.58E-04	9
1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	8.13E-07	1.561E-07	1.905E-06	3.37E-09	2.58E-04	10
1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	7.73E-07	1.077E-07	1.315E-06	2.46E-09	2.58E-04	11
1.0000	3.496E+05	2.6439E+05	2.5658E+13	25.8	7.36E-07	7.489E-08	9.142E-07	1.80E-09	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO.	Q/QSATF FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.9469	1.8868	1.8170	1.7541	1.6762	1.5972	1.5378	1.4916
3	2.1635	2.0734	1.9801	1.8992	1.8012	1.7035	1.6309	1.5749
4	2.2890	2.1803	2.0728	1.9811	1.8713	1.7626	1.6825	1.6208
5	2.3775	2.2555	2.1380	2.0387	1.9205	1.8042	1.7186	1.6530
6	2.4459	2.3135	2.1881	2.0829	1.9583	1.8361	1.7464	1.6777
7	2.4978	2.3563	2.2243	2.1141	1.9841	1.8570	1.7640	1.6928
8	2.5419	2.3928	2.2552	2.1409	2.0063	1.8752	1.7793	1.7060
9	2.5802	2.4245	2.2821	2.1642	2.0258	1.8911	1.7928	1.7177
10	2.6141	2.4526	2.3060	2.1849	2.0431	1.9053	1.8049	1.7282
11	2.6444	2.4778	2.3274	2.2036	2.0587	1.9182	1.8158	1.7377
12	2.6718	2.5006	2.3469	2.2205	2.0729	1.9298	1.8257	1.7468

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.4387	1.3873	1.3341	1.2824	1.2309	1.1777	1.1262
3	1.5111	1.4497	1.3864	1.3252	1.2647	1.2025	1.1427
4	1.5507	1.4835	1.4144	1.3479	1.2822	1.2149	1.1505
5	1.5785	1.5072	1.4341	1.3638	1.2946	1.2238	1.1561
6	1.5999	1.5255	1.4493	1.3761	1.3042	1.2307	1.1561
7	1.6124	1.5356	1.4570	1.3817	1.3079	1.2326	1.1561
8	1.6234	1.5444	1.4639	1.3817	1.3079	1.2326	1.1561
9	1.6331	1.5524	1.4639	1.3817	1.3079	1.2326	1.1561
10	1.6419	1.5596	1.4639	1.3817	1.3079	1.2326	1.1561
11	1.6498	1.5596	1.4639	1.3817	1.3079	1.2326	1.1561
12	1.6498	1.5596	1.4639	1.3817	1.3079	1.2326	1.1561

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.35509E-17	0.60849E-17	0.91836E-17	0.12828E-16	0.19290E-16	0.29723E-16	0.42190E-16	0.56661E-16
3	0.39459E-17	0.66868E-17	0.10008E-16	0.13888E-16	0.20727E-16	0.31700E-16	0.44745E-16	0.59825E-16
4	0.41747E-17	0.70315E-17	0.10476E-16	0.14487E-16	0.21534E-16	0.32801E-16	0.46158E-16	0.61566E-16
5	0.43362E-17	0.72742E-17	0.10806E-16	0.14908E-16	0.22100E-16	0.33574E-16	0.47150E-16	0.62789E-16
6	0.44608E-17	0.74610E-17	0.11059E-16	0.15232E-16	0.22535E-16	0.34167E-16	0.47912E-16	0.63728E-16
7	0.45555E-17	0.75992E-17	0.11242E-16	0.15460E-16	0.22832E-16	0.34558E-16	0.48395E-16	0.64304E-16
8	0.46360E-17	0.77168E-17	0.11398E-16	0.15656E-16	0.23088E-16	0.34895E-16	0.48815E-16	0.64805E-16
9	0.47058E-17	0.78193E-17	0.11534E-16	0.15827E-16	0.23312E-16	0.35191E-16	0.49185E-16	0.65250E-16
10	0.47676E-17	0.79099E-17	0.11655E-16	0.15978E-16	0.23512E-16	0.35456E-16	0.49516E-16	0.65648E-16
11	0.48229E-17	0.79911E-17	0.11763E-16	0.16114E-16	0.23691E-16	0.35695E-16	0.49816E-16	0.66009E-16
12	0.48729E-17	0.80647E-17	0.11862E-16	0.16238E-16	0.23854E-16	0.35912E-16	0.50089E-16	0.66339E-16

INCREMENT							
	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.50445E-14
2	0.82072E-16	0.12278E-15	0.19829E-15	0.34361E-15	0.67020E-15	0.16355E-14	0.54834E-14
3	0.86207E-16	0.12830E-15	0.20606E-15	0.35510E-15	0.68862E-15	0.16700E-14	0.55639E-14
4	0.88465E-16	0.13129E-15	0.21022E-15	0.36116E-15	0.69814E-15	0.16873E-14	0.56019E-14
5	0.90052E-16	0.13339E-15	0.21315E-15	0.36543E-15	0.70489E-15	0.16996E-14	0.56293E-14
6	0.91270E-16	0.13501E-15	0.21541E-15	0.36873E-15	0.71009E-15	0.17091E-14	0.56293E-14
7	0.91983E-16	0.13590E-15	0.21655E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14
8	0.92608E-16	0.13669E-15	0.21757E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14
9	0.93164E-16	0.13739E-15	0.21757E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14
10	0.93664E-16	0.13803E-15	0.21757E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14
11	0.94118E-16	0.13803E-15	0.21757E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14
12	0.94118E-16	0.13803E-15	0.21757E-15	0.37023E-15	0.71210E-15	0.17119E-14	0.56293E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	DCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.500E-07	1.590	0.000	0.0020	0.0396	99.7034	9.868	0.2966	40.3731	0.877	59.6269
3.500E-07	1.414	0.400	4.2115	0.5009	99.6922	9.805	0.3078	99.6226	9.459	0.3774
4.500E-07	1.320	0.600	5.6672	0.7109	99.7239	9.949	0.2761	99.6430	9.553	0.3570
5.500E-07	1.261	1.667	12.8763	1.4877	99.7742	10.330	0.2258	99.7311	10.034	0.2689
7.000E-07	1.205	5.000	28.7347	3.5058	99.8320	10.831	0.1680	99.7887	10.443	0.2113
9.000E-07	1.159	4.933	18.0697	2.7757	99.8929	11.595	0.1071	99.8304	10.816	0.1696
1.100E-06	1.130	4.733	11.3078	2.3848	99.9300	12.316	0.0700	99.8482	11.003	0.1518
1.300E-06	1.110	4.000	6.2743	2.1089	99.9541	13.033	0.0459	99.8411	10.926	0.1589
1.600E-06	1.090	8.000	7.2198	4.1603	99.9736	13.970	0.0264	99.8433	10.949	0.1567
2.000E-06	1.072	6.667	3.0073	4.1151	99.9868	15.146	0.0132	99.8140	10.659	0.1860
3.500E-06	1.041	10.667	0.5714	8.1215	99.9949	16.742	0.0051	99.7706	10.303	0.2294
5.000E-06	1.029	11.333	0.0547	9.4814	99.9984	18.758	0.0016	99.7321	10.041	0.2679
8.000E-06	1.018	12.000	0.0407	15.4421	99.9999	22.833	0.0001	99.5894	9.316	0.4106
1.500E-05	1.010	19.333	0.0656	26.0743	99.9999	33.947	0.0001	99.5206	9.054	0.4794
						59.047	0.0001	99.5936	9.334	0.4064

EFFICIENCY = STATED = 99.48 COMPUTED = 99.4760 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9708
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 9.059E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.453E+00
LOG-NORMAL GOODNESS OF FIT = 0.963
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.796

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.6986
CORRECTED MMD OF EFFLUENT = 4.735E+00
CORRECTED SIGMAP OF EFFLUENT = 2.695E+00
LOG-NORMAL GOODNESS OF FIT = 0.981
CORRECTED PRECIPITATION RATE PARAMETER = 9.84

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.244E+00	9.182E+01	1.264E-06	2.529E-04	2.541E-04	4.360E-02	2.500E-07
4.518E+00	9.304E+01	3.498E-03	8.356E-04	4.534E-03	1.022E-01	3.500E-07
4.873E+00	9.435E+01	6.416E-03	1.880E-03	8.295E-03	1.784E-01	4.500E-07
5.257E+00	9.550E+01	1.784E-02	3.407E-03	2.125E-02	2.642E-01	5.500E-07
5.855E+00	9.684E+01	2.523E-02	6.501E-03	3.173E-02	7.953E-01	7.000E-07
6.664E+00	9.804E+01	2.046E-02	1.193E-02	3.239E-02	1.132E+00	9.000E-07
7.474E+00	9.878E+01	1.569E-02	1.836E-02	3.406E-02	1.424E+00	1.100E-06
8.280E+00	9.924E+01	1.028E-02	2.534E-02	3.562E-02	1.661E+00	1.300E-06
9.477E+00	9.963E+01	7.257E-03	3.585E-02	4.311E-02	3.831E+00	1.600E-06
1.106E+01	9.985E+01	3.786E-03	4.961E-02	5.340E-02	4.234E+00	2.000E-06
1.337E+01	9.996E+01	1.529E-03	6.666E-02	6.818E-02	8.791E+00	2.600E-06
1.682E+01	1.000E+02	5.017E-04	8.532E-02	8.582E-02	1.044E+01	3.500E-06
2.283E+01	1.000E+02	3.409E-05	9.914E-02	9.917E-02	1.709E+01	5.000E-06
3.395E+01	1.000E+02	2.013E-05	9.732E-02	9.734E-02	2.114E+01	8.000E-06
5.905E+01	1.000E+02	2.390E-05	9.795E-02	9.798E-02	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.6986 % SCA = 5.899E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 4.735E+00 UM OUTLET SIGMAP = 2.695E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*     T.E.R.L.-R.T.P. AND SO.R.I.    *
*                                    *
*        REVISION 1,JAN. 1, 1978     *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 16 NDATA = 3

DATA ON CARD NUMBER 2

LAB ESP; SCA=400FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER 3

VGS(1) = 6.2500E+01 FT**3/MIN VGASS(1) = 1.0000E+00 FT/SEC

VGS(2) = 6.2500E+01 FT**3/MIN VGASS(2) = 1.0000E+00 FT/SEC

VGS(3) = 6.2500E+01 FT**3/MIN VGASS(3) = 1.0000E+00 FT/SEC

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=400FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.015E-06 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.956E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 3.050E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0299	3.622E+05	2.7361E+05	2.4048E+13	25.8	4.93E-06	2.023E-05	1.852E-04	3.84E-08	2.58E-04	1
1.0125	3.622E+05	2.7275E+05	2.4461E+13	25.8	2.08E-06	7.107E-06	6.506E-05	4.14E-08	2.58E-04	2
1.0049	3.622E+05	2.7275E+05	2.4646E+13	25.8	1.49E-06	3.207E-06	2.936E-05	2.67E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.015E-06 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.956E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 3.050E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0019	3.606E+05	2.7132E+05	2.4826E+13	25.8	1.24E-06	1.636E-06	1.498E-05	1.70E-08	2.58E-04	4
1.0008	3.606E+05	2.7132E+05	2.4855E+13	25.8	1.05E-06	8.958E-07	8.201E-06	1.10E-08	2.58E-04	5
1.0003	3.606E+05	2.7132E+05	2.4866E+13	25.8	9.33E-07	5.103E-07	4.671E-06	7.09E-09	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 1.015E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 2.956E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 3.050E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 35.44

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0001	3.496E+05	2.6438E+05	2.5655E+13	25.8	8.52E-07	2.922E-07	2.675E-06	4.49E-09	2.58E-04	7
1.0001	3.496E+05	2.6438E+05	2.5657E+13	25.8	7.93E-07	1.796E-07	1.617E-06	2.95E-09	2.58E-04	8
1.0000	3.496E+05	2.6438E+05	2.5658E+13	25.8	7.42E-07	1.083E-07	9.919E-07	1.94E-09	2.58E-04	9

1,0000	3,496E+05	2,6438E+05	2,5658E+13	25,8	6,99E-07	6,722E-08	6,154E-07	1,28E-09	2,58E-04	10
1,0000	3,496E+05	2,6438E+05	2,5658E+13	25,8	6,79E-07	4,209E-08	3,853E-07	8,51E-10	2,58E-04	11
1,0000	3,496E+05	2,6438E+05	2,5659E+13	25,8	6,62E-07	2,654E-08	2,429E-07	5,65E-10	2,58E-04	12

EST, EFFICIENCY = 99,48 UNCORRECTED COMPUTED EFFICIENCY = 99,86

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=400FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 1,015E-06 KG/SEC

APPLIED VOLTAGE = 4,600E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 2,956E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 3,050E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 42,28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0356	3,622E+05	2,7389E+05	2,3914E+13	25,8	4,93E-06	2,024E-05	1,853E-04	3,84E-08	2,58E-04	1
1,0133	3,622E+05	2,7279E+05	2,4441E+13	25,8	2,08E-06	7,102E-06	6,502E-05	4,14E-08	2,58E-04	2
1,0047	3,622E+05	2,7279E+05	2,4651E+13	25,8	1,49E-06	3,205E-06	2,934E-05	2,67E-08	2,58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 1,015E-06 KG/SEC

APPLIED VOLTAGE = 4,580E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 2,956E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 1,500E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 3,050E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 42,28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0017	3,606E+05	2,7131E+05	2,4833E+13	25,8	1,24E-06	1,635E-06	1,497E-05	1,70E-08	2,58E-04	4
1,0006	3,606E+05	2,7131E+05	2,4859E+13	25,8	1,05E-06	8,953E-07	8,197E-06	1,10E-08	2,58E-04	5
1,0002	3,606E+05	2,7131E+05	2,4869E+13	25,8	9,33E-07	5,100E-07	4,669E-06	7,08E-09	2,58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1,5250 M

COLLECTION AREA = 1,162E+00 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 7,869E-05 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 1,015E-06 KG/SEC

APPLIED VOLTAGE = 4,440E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 2,581E-04 AMP/M2
GAS FLOW RATE = 2,956E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 3,000E-04 AMPS
CORONA WIRE LENGTH = 3,812E+00 M
DEPOSIT E FIELD = 2,581E+03 VOLT/M
GAS VELOCITY = 3,050E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 42,28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,

1.0001	3.496E+05	2.6436E+05	2.5657E+13	25.8	8.52E-07	2.921E-07	2.674E-06	4.49E-09	2.58E-04	7
1.0000	3.496E+05	2.6436E+05	2.5658E+13	25.8	7.92E-07	1.766E-07	1.616E-06	2.95E-09	2.58E-04	8
1.0000	3.496E+05	2.6436E+05	2.5658E+13	25.8	7.42E-07	1.083E-07	9.916E-07	1.94E-09	2.58E-04	9
1.0000	3.496E+05	2.6436E+05	2.5658E+13	25.8	6.99E-07	6.721E-08	6.153E-07	1.28E-09	2.58E-04	10
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.79E-07	4.20AE-08	3.852E-07	8.51E-10	2.58E-04	11
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.62E-07	2.653E-08	2.429E-07	5.65E-10	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	2.0379	1.9656	1.8862	1.8159	1.7297	1.6429	1.5780	1.5277
3	2.2540	2.1509	2.0476	1.9591	1.8527	1.7473	1.6693	1.6092
4	2.3785	2.2566	2.1391	2.0398	1.9216	1.8053	1.7198	1.6541
5	2.4663	2.3309	2.2034	2.0965	1.9700	1.8461	1.7552	1.6856
6	2.5340	2.3882	2.2528	2.1401	2.0072	1.8774	1.7825	1.7099
7	2.5853	2.4304	2.2884	2.1707	2.0325	1.8980	1.7997	1.7247
8	2.6289	2.4664	2.3188	2.1970	2.0543	1.9157	1.8147	1.7376
9	2.6668	2.4977	2.3454	2.2200	2.0735	1.9314	1.8279	1.7490
10	2.7002	2.5254	2.3689	2.2404	2.0905	1.9453	1.8397	1.7593
11	2.7302	2.5503	2.3900	2.2588	2.1058	1.9579	1.8504	1.7686
12	2.7574	2.5729	2.4092	2.2755	2.1198	1.9694	1.8602	1.7771

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.4701	1.4144	1.3569	1.3011	1.2457	1.1885	1.1333
3	1.5409	1.4753	1.4078	1.3428	1.2786	1.2126	1.1494
4	1.5796	1.5083	1.4352	1.3648	1.2956	1.2247	1.1570
5	1.6069	1.5315	1.4544	1.3804	1.3076	1.2333	1.1625
6	1.6278	1.5494	1.4692	1.3924	1.3170	1.2400	1.1625
7	1.6400	1.5592	1.4767	1.3978	1.3205	1.2419	1.1625
8	1.6507	1.5678	1.4834	1.3978	1.3205	1.2419	1.1625
9	1.6602	1.5756	1.4834	1.3978	1.3205	1.2419	1.1625
10	1.6687	1.5756	1.4834	1.3978	1.3205	1.2419	1.1625
11	1.6765	1.5756	1.4834	1.3978	1.3205	1.2419	1.1625
12	1.6765	1.5756	1.4834	1.3978	1.3205	1.2419	1.1625

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.37167E-17	0.63392E-17	0.95334E-17	0.13279E-16	0.19905E-16	0.30573E-16	0.43292E-16	0.58029E-16
3	0.41109E-17	0.69367E-17	0.10349E-16	0.14326E-16	0.21320E-16	0.32515E-16	0.45796E-16	0.61127E-16
4	0.43379E-17	0.72776E-17	0.10811E-16	0.14917E-16	0.22113E-16	0.33595E-16	0.47181E-16	0.62832E-16
5	0.44981E-17	0.75174E-17	0.11136E-16	0.15331E-16	0.22670E-16	0.34354E-16	0.48154E-16	0.64029E-16
6	0.46215E-17	0.77020E-17	0.11386E-16	0.15650E-16	0.23098E-16	0.34937E-16	0.48902E-16	0.64950E-16
7	0.47151E-17	0.78381E-17	0.11566E-16	0.15874E-16	0.23390E-16	0.35319E-16	0.49374E-16	0.65512E-16
8	0.47946E-17	0.79542E-17	0.11720E-16	0.16066E-16	0.23641E-16	0.35649E-16	0.49785E-16	0.66003E-16
9	0.48637E-17	0.80552E-17	0.11854E-16	0.16235E-16	0.23861E-16	0.35940E-16	0.50147E-16	0.66437E-16
10	0.49248E-17	0.81447E-17	0.11973E-16	0.16384E-16	0.24057E-16	0.36200E-16	0.50472E-16	0.66827E-16
11	0.49795E-17	0.82250E-17	0.12080E-16	0.16518E-16	0.24233E-16	0.36435E-16	0.50766E-16	0.67181E-16
12	0.50290E-17	0.82977E-17	0.12177E-16	0.16640E-16	0.24394E-16	0.36649E-16	0.51034E-16	0.67505E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.50445E-14
2	0.83865E-16	0.12518E-15	0.20167E-15	0.34862E-15	0.67823E-15	0.16505E-14	0.55181E-14
3	0.87907E-16	0.13057E-15	0.20925E-15	0.35980E-15	0.69614E-15	0.16841E-14	0.55966E-14
4	0.90115E-16	0.13349E-15	0.21331E-15	0.36570E-15	0.70540E-15	0.17008E-14	0.56334E-14
5	0.91668E-16	0.13555E-15	0.21617E-15	0.36988E-15	0.71197E-15	0.17128E-14	0.56601E-14
6	0.92862E-16	0.13713E-15	0.21837E-15	0.37309E-15	0.71705E-15	0.17221E-14	0.56601E-14
7	0.93556E-16	0.13799E-15	0.21949E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14
8	0.94166E-16	0.13876E-15	0.22048E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14
9	0.94708E-16	0.13944E-15	0.22048E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14
10	0.95197E-16	0.13944E-15	0.22048E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14
11	0.95642E-16	0.13944E-15	0.22048E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14
12	0.95642E-16	0.13944E-15	0.22048E-15	0.37454E-15	0.71898E-15	0.17247E-14	0.56601E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0025	0.0421	99.9674	10.209	0.0326	80.0180	2.048	19.9820
3.500E-07	1.414	0.400	5.4925	0.2473	99.9647	10.109	0.0353	99.9414	9.462	0.0586
4.500E-07	1.320	0.600	7.2462	0.3682	99.9690	10.272	0.0310	99.9418	9.471	0.0582
5.500E-07	1.261	1.667	15.5407	0.6754	99.9761	10.601	0.0239	99.9616	9.999	0.0384
7.000E-07	1.205	5.000	31.7450	1.6263	99.9837	11.090	0.0163	99.9691	10.278	0.0309
9.000E-07	1.159	4.933	17.3106	1.5609	99.9910	11.844	0.0090	99.9700	10.313	0.0300
1.100E-06	1.130	4.733	9.4716	1.6298	99.9949	12.558	0.0051	99.9673	10.206	0.0327
1.300E-06	1.110	4.000	4.5729	1.7261	99.9971	13.270	0.0029	99.9591	9.919	0.0409
1.600E-06	1.090	8.000	4.4035	3.8148	99.9986	14.199	0.0014	99.9548	9.792	0.0452
2.000E-06	1.072	6.667	1.4808	4.8242	099.9994	11.644	0.0006	99.9314	9.262	0.0686
2.600E-06	1.055	10.667	0.6656	8.6745	99.9998	13.944	0.0002	99.9229	9.113	0.0771
3.500E-06	1.041	10.667	0.4200	10.0811	99.9999	17.359	0.0001	99.9103	8.922	0.0897
5.000E-06	1.029	11.333	0.4378	16.4881	99.9999	23.051	0.0001	99.8620	8.374	0.1380
8.000E-06	1.018	12.000	0.4635	20.3913	99.9999	34.198	0.0001	99.8388	8.176	0.1612
1.500E-05	1.010	19.333	0.7468	27.8498	99.9999	59.363	0.0001	99.8633	8.386	0.1367

EFFICIENCY = STATED = 99.86 COMPUTED = 99.8635 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9974
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 9.463E-01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.715E+00
LOG-NORMAL GOODNESS OF FIT = 0.907
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.441

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.9051
CORRECTED MMD OF EFFLUENT = 5.524E+00
CORRECTED SIGMAP OF EFFLUENT = 2.597E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 8.85

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/D'OGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.391E+00	9.684E+01	1.388E-07	8.502E-05	8.516E-05	4.360E-02	2.500E-07
4.658E+00	9.744E+01	4.233E-04	2.809E-04	7.043E-04	1.022E-01	3.500E-07
5.011E+00	9.806E+01	7.200E-04	6.320E-04	1.352E-03	1.784E-01	4.500E-07
5.395E+00	9.856E+01	1.890E-03	1.146E-03	3.036E-03	2.442E-01	5.500E-07
5.994E+00	9.910E+01	2.447E-03	2.186E-03	4.633E-03	7.953E-01	7.000E-07
6.807E+00	9.953E+01	1.720E-03	4.013E-03	5.733E-03	1.132E+00	9.000E-07
7.620E+00	9.975E+01	1.152E-03	6.175E-03	7.327E-03	1.424E+00	1.100E-06
8.430E+00	9.987E+01	6.577E-04	8.521E-03	9.179E-03	1.661E+00	1.300E-06
9.634E+00	9.995E+01	3.885E-04	1.205E-02	1.244E-02	3.831E+00	1.600E-06
1.121E+01	9.999E+01	1.636E-04	1.668E-02	1.685E-02	4.234E+00	2.000E-06
1.355E+01	1.000E+02	4.758E-05	2.241E-02	2.246E-02	8.791E+00	2.600E-06
1.736E+01	1.000E+02	3.237E-05	2.869E-02	2.872E-02	1.044E+01	3.500E-06
2.305E+01	1.000E+02	2.394E-05	3.333E-02	3.336E-02	1.709E+01	5.000E-06
3.420E+01	1.000E+02	2.012E-05	3.272E-02	3.274E-02	2.114E+01	8.000E-06
5.936E+01	1.000E+02	2.389E-05	3.294E-02	3.296E-02	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.9051 % SCA = 7.865E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V
AVG. CURRENT DENSITY = 25.81 NA/CM**2
RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00
OUTLET MMD = 5.524E+00 UM OUTLET SIGMAP = 2.597E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  3

DATA ON CARD NUMBER   2

LAB ESP: SCA=600FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER   3

VGS( 1) =  4.1667E+01 FT**3/MIN  VGASS( 1) =  6.6667E-01 FT/SEC
VGS( 2) =  4.1667E+01 FT**3/MIN  VGASS( 2) =  6.6667E-01 FT/SEC
VGS( 3) =  4.1667E+01 FT**3/MIN  VGASS( 3) =  6.6667E-01 FT/SEC
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=600FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0238	3.622E+05	2.7332E+05	2.4191E+13	25.8	4.39E-06	2.369E-05	1.446E-04	3.32E-08	2.58E-04	1
1.0074	3.622E+05	2.7252E+05	2.4583E+13	25.8	1.63E-06	6.514E-06	3.976E-05	3.22E-08	2.58E-04	2
1.0021	3.622E+05	2.7252E+05	2.4715E+13	25.8	1.21E-06	2.348E-06	1.433E-05	1.66E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0006	3.606E+05	2.7126E+05	2.4860E+13	25.8	9.74E-07	9.692E-07	5.916E-06	8.58E-09	2.58E-04	4
1.0002	3.606E+05	2.7126E+05	2.4870E+13	25.8	8.42E-07	4.325E-07	2.640E-06	4.49E-09	2.58E-04	5
1.0001	3.606E+05	2.7126E+05	2.4873E+13	25.8	7.57E-07	2.013E-07	1.229E-06	2.37E-09	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 42.28

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0000	3.496E+05	2.6436E+05	2.5658E+13	25.8	6.94E-07	9.452E-08	5.769E-07	1.22E-09	2.58E-04	7
1.0000	3.496E+05	2.6436E+05	2.5658E+13	25.8	6.66E-07	4.497E-08	2.867E-07	6.59E-10	2.58E-04	8
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.43E-07	2.368E-08	1.445E-07	3.57E-10	2.58E-04	9

1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.24E-07	1.207E-08	7.365E-08	1.93E-10	2.58E-04	10
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.07E-07	6.201E-09	3.785E-08	1.05E-10	2.58E-04	11
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	5.91E-07	3.208E-09	1.958E-08	5.72E-11	2.58E-04	12

EST. EFFICIENCY = 99.86 UNCORRECTED COMPUTED EFFICIENCY = 99.99

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=600FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0300	3.622E+05	2.7361E+05	2.4044E+13	25.8	4.38E-06	2.370E-05	1.447E-04	3.32E-08	2.58E-04	1
1.0076	3.622E+05	2.7253E+05	2.4580E+13	25.8	1.63E-06	6.508E-06	3.972E-05	3.21E-08	2.58E-04	2
1.0017	3.622E+05	2.7253E+05	2.4724E+13	25.8	1.21E-06	2.347E-06	1.432E-05	1.66E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0004	3.606E+05	2.7125E+05	2.4864E+13	25.8	9.74E-07	9.687E-07	5.912E-06	8.58E-09	2.58E-04	4
1.0001	3.606E+05	2.7125E+05	2.4872E+13	25.8	8.42E-07	4.323E-07	2.638E-06	4.49E-09	2.58E-04	5
1.0000	3.606E+05	2.7125E+05	2.4874E+13	25.8	7.57E-07	2.012E-07	1.228E-06	2.37E-09	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 6.770E-07 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.971E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 2.033E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0000	3.496E+05	2.6436E+05	2.565AE+13	25.A	6.94E-07	9.44AE-08	5.767E-07	1.22E-09	2.58E-04	7
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.A	6.66E-07	4.695E-0A	2.A66E-07	6.59E-10	2.58E-04	A
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.A	6.43E-07	2.367E-0A	1.445E-07	3.56E-10	2.58E-04	9
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.A	6.24E-07	1.206E-0A	7.362E-08	1.93E-10	2.58E-04	10
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.A	6.07E-07	6.199E-09	3.7A4E-0A	1.05E-10	2.58E-04	11
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.A	5.91E-07	3.207E-09	1.958E-08	5.71E-11	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	2.1669	2.0777	1.9851	1.9045	1.8069	1.7093	1.6367	1.5805
3	2.3808	2.2595	2.1424	2.0434	1.9254	1.8092	1.7237	1.6580
4	2.5036	2.3631	2.2317	2.1219	1.9922	1.8653	1.7722	1.7010
5	2.5901	2.4361	2.2946	2.1772	2.0393	1.9048	1.8065	1.7314
6	2.6569	2.4924	2.3431	2.2199	2.0755	1.9353	1.8330	1.7549
7	2.7073	2.5337	2.3778	2.2497	2.1001	1.9551	1.8496	1.7692
8	2.7502	2.5690	2.4075	2.2754	2.1213	1.9724	1.8641	1.7816
9	2.7876	2.5997	2.4335	2.2978	2.1400	1.9875	1.8769	1.7927
10	2.8206	2.6270	2.4566	2.3178	2.1566	2.0011	1.8884	1.8026
11	2.8502	2.6515	2.4774	2.3358	2.1716	2.0134	1.8988	1.8117
12	2.8770	2.6737	2.4962	2.3521	2.1852	2.0246	1.9083	1.8117

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.5164	1.4545	1.3906	1.3288	1.2674	1.2042	1.1435
3	1.5834	1.5119	1.4385	1.3679	1.2983	1.2269	1.1588
4	1.6204	1.5434	1.4645	1.3888	1.3144	1.2384	1.1660
5	1.6466	1.5657	1.4829	1.4037	1.3259	1.2466	1.1712
6	1.6669	1.5829	1.4972	1.4152	1.3349	1.2530	1.1712
7	1.6786	1.5923	1.5043	1.4204	1.3382	1.2548	1.1712
8	1.6888	1.6006	1.5043	1.4204	1.3382	1.2548	1.1712
9	1.6980	1.6080	1.5043	1.4204	1.3382	1.2548	1.1712
10	1.7063	1.6080	1.5043	1.4204	1.3382	1.2548	1.1712
11	1.7063	1.6080	1.5043	1.4204	1.3382	1.2548	1.1712
12	1.7063	1.6080	1.5043	1.4204	1.3382	1.2548	1.1712

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.39521E-17	0.67006E-17	0.10033E-16	0.13928E-16	0.20793E-16	0.31809E-16	0.44903E-16	0.60037E-16
3	0.43422E-17	0.72870E-17	0.10828E-16	0.14943E-16	0.22157E-16	0.33668E-16	0.47289E-16	0.62979E-16
4	0.45661E-17	0.76212E-17	0.11280E-16	0.15517E-16	0.22926E-16	0.34711E-16	0.48621E-16	0.64614E-16
5	0.47240E-17	0.78566E-17	0.11597E-16	0.15922E-16	0.23467E-16	0.35446E-16	0.49562E-16	0.65770E-16
6	0.48457E-17	0.80380E-17	0.11842E-16	0.16234E-16	0.23885E-16	0.36013E-16	0.50288E-16	0.66662E-16
7	0.49377E-17	0.81713E-17	0.12018E-16	0.16452E-16	0.24168E-16	0.36383E-16	0.50743E-16	0.67203E-16
8	0.50160E-17	0.82851E-17	0.12168E-16	0.16639E-16	0.24412E-16	0.36703E-16	0.51140E-16	0.67676E-16
9	0.50840E-17	0.83844E-17	0.12300E-16	0.16804E-16	0.24626E-16	0.36986E-16	0.51492E-16	0.68096E-16
10	0.51442E-17	0.84723E-17	0.12416E-16	0.16950E-16	0.24818E-16	0.37239E-16	0.51807E-16	0.68475E-16
11	0.51982E-17	0.85512E-17	0.12521E-16	0.17081E-16	0.24990E-16	0.37468E-16	0.52093E-16	0.68818E-16
12	0.52471E-17	0.86228E-17	0.12616E-16	0.17201E-16	0.25147E-16	0.37676E-16	0.52354E-16	0.68818E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.50445E-14
2	0.86508E-16	0.12873E-15	0.20669E-15	0.35604E-15	0.69008E-15	0.16724E-14	0.55677E-14
3	0.90330E-16	0.13381E-15	0.21381E-15	0.36652E-15	0.70686E-15	0.17039E-14	0.56421E-14
4	0.92442E-16	0.13659E-15	0.21767E-15	0.37212E-15	0.71564E-15	0.17198E-14	0.56771E-14
5	0.93937E-16	0.13857E-15	0.22041E-15	0.37611E-15	0.72192E-15	0.17313E-14	0.57027E-14
6	0.95091E-16	0.14009E-15	0.22253E-15	0.37921E-15	0.72679E-15	0.17402E-14	0.57027E-14
7	0.95757E-16	0.14092E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14
8	0.96344E-16	0.14166E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14
9	0.96867E-16	0.14231E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14
10	0.97340E-16	0.14231E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14
11	0.97340E-16	0.14231E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14
12	0.97340E-16	0.14231E-15	0.22359E-15	0.38058E-15	0.72861E-15	0.17426E-14	0.57027E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0006	0.0367	99.9997	5.202	0.0003	95.0532	2.548	4.9468
3.500E-07	1.414	0.400	1.5103	2.5305	99.9996	5.430	0.0004	99.8293	5.402	0.1707
4.500E-07	1.320	0.600	1.9326	2.6096	99.9997	5.768	0.0003	99.8826	5.720	0.1174
5.500E-07	1.261	1.667	3.7287	4.5933	99.9998	6.147	0.0002	99.9257	6.107	0.0743
7.000E-07	1.205	5.000	6.4419	7.1206	99.9999	6.746	0.0001	99.9616	6.666	0.0384
9.000E-07	1.159	4.933	4.6784	3.3483	99.9999	7.564	0.0001	99.9817	7.294	0.0183
1.100E-06	1.130	4.733	4.4041	2.0332	99.9999	8.384	0.0001	99.9884	7.682	0.0116
1.300E-06	1.110	4.000	3.7220	1.6366	99.9999	9.160	0.0001	99.9890	7.724	0.0110
1.600E-06	1.090	8.000	7.4440	3.2319	99.9999	10.331	0.0001	99.9891	7.734	0.0109
2.000E-06	1.072	6.667	6.2037	3.4248	99.9999	11.884	0.0001	99.9861	7.531	0.0139
2.600E-06	1.055	10.667	10.1165	7.0730	99.9999	14.140	0.0001	99.9821	7.314	0.0179
3.500E-06	1.041	10.667	10.1165	8.3940	99.9999	17.639	0.0001	99.9788	7.169	0.0212
5.000E-06	1.029	11.333	10.5454	13.7473	99.9999	23.359	0.0001	99.9673	6.802	0.0327
8.000E-06	1.018	12.000	11.1660	17.0011	99.9999	34.553	0.0001	99.9618	6.671	0.0382
1.500E-05	1.010	19.333	17.9892	23.2190	99.9999	59.809	0.0001	99.9676	6.811	0.0324

EFFICIENCY = STATED = 99.99 COMPUTED = 99.9897 CONVE NCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9999
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.991E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.358E+00
LOG-NORMAL GOODNESS OF FIT = 0.910
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.671

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.9730
CORRECTED MMD OF EFFLUENT = 3.727E+00
CORRECTED SIGMAP OF EFFLUENT = 3.060E+00
LOG-NORMAL GOODNESS OF FIT = 0.925
CORRECTED PRECIPITATION RATE PARAMETER = 6.97

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.596E+00	9.956E+01	1.412E-09	2.016E-05	2.016E-05	4.360E-02	2.500E-07
4.854E+00	9.967E+01	4.799E-06	6.662E-05	7.142E-05	1.022E-01	3.500E-07
5.204E+00	9.978E+01	7.918E-06	1.499E-04	1.57AE-04	1.784E-01	4.500E-07
5.588E+00	9.986E+01	1.870E-05	2.717E-04	2.904E-04	2.642E-01	5.500E-07
6.190E+00	9.993E+01	2.047E-05	5.183E-04	5.388E-04	7.953E-01	7.000E-07
7.007E+00	9.997E+01	1.917E-05	9.516E-04	9.707E-04	1.132E+00	9.000E-07
7.826E+00	9.999E+01	2.208E-05	1.464E-03	1.486E-03	1.424E+00	1.100E-06
8.639E+00	1.000E+02	2.207E-05	2.021E-03	2.043E-03	1.661E+00	1.300E-06
1.033E+01	1.000E+02	2.708E-05	2.858E-03	2.885E-03	3.831E+00	1.600E-06
1.188E+01	1.000E+02	2.826E-05	3.956E-03	3.984E-03	4.234E+00	2.000E-06
1.414E+01	1.000E+02	2.982E-05	5.315E-03	5.344E-03	8.791E+00	2.600E-06
1.764E+01	1.000E+02	3.215E-05	6.803E-03	6.835E-03	1.044E+01	3.500E-06
2.336E+01	1.000E+02	2.378E-05	7.904E-03	7.928E-03	1.709E+01	5.000E-06
3.455E+01	1.000E+02	1.998E-05	7.759E-03	7.779E-03	2.114E+01	8.000E-06
5.981E+01	1.000E+02	2.373E-05	7.810E-03	7.834E-03	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.9730 % SCA = 1.180E+02 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 0.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 3.727E+00 UM OUTLET SIGMAP = 3.060E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**********************************
*                                *
*        E.P.A. ESP MODEL        *
*                                *
*    I.E.R.L.-R.T.P. AND SO.P.I. *
*                                *
*      REVISION I,JAN. 1, 1978   *
*                                *
**********************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  3

DATA ON CARD NUMBER   2

LAB ESP: SCA=800FT2/1000ACFM;J=24UA/FT2

DATA ON CARD NUMBER   3

VGS( 1) =  3.1250E+01 FT**3/MIN  VGASS( 1) =  5.0000E-01 FT/SEC
VGS( 2) =  3.1250E+01 FT**3/MIN  VGASS( 2) =  5.0000E-01 FT/SEC
VGS( 3) =  3.1250E+01 FT**3/MIN  VGASS( 3) =  5.0000E-01 FT/SEC
```

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=800FT2/1000ACFM;J=24UA/FT2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 5.077E-07 KG/SEC

APPLIED VOLTAGE = 4.600E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.478E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 1.525E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0225	3.622E+05	2.7327E+05	2.4221E+13	25.8	4.02E-06	2.600E-05	1.190E-04	2.94E-08	2.58E-04	1
1.0048	3.622E+05	2.7152E+05	2.4647E+13	25.8	1.44E-06	5.784E-06	2.647E-05	2.54E-08	2.58E-04	2
1.0009	3.622E+05	2.7152E+05	2.4745E+13	25.8	1.02E-06	1.671E-06	7.650E-06	1.06E-08	2.58E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 5.077E-07 KG/SEC

APPLIED VOLTAGE = 4.580E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.478E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.500E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 1.525E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0002	3.606E+05	2.7124E+05	2.4870E+13	25.8	8.35E-07	5.633E-07	2.579E-06	4.44E-09	2.58E-04	4
1.0000	3.606E+05	2.7124E+05	2.4873E+13	25.8	7.26E-07	2.052E-07	9.392E-07	1.89E-09	2.58E-04	5
1.0000	3.606E+05	2.7124E+05	2.4874E+13	25.8	6.71E-07	7.801E-08	3.571E-07	8.11E-10	2.58E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 7.869E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 5.077E-07 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.581E-04 AMP/M2
GAS FLOW RATE = 1.478E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 3.000E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.581E+03 VOLT/M
GAS VELOCITY = 1.525E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 53.41

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.40E-07	2.996E-08	1.372E-07	3.43E-10	2.58E-04	7
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	6.15E-07	1.221E-08	5.591E-08	1.51E-10	2.58E-04	8
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	5.93E-07	5.050E-09	2.311E-08	6.71E-11	2.58E-04	9

1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	5.73E-07	2.110E-09	9.657E-09	2.98E-11	2.58E-04	10
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	5.53E-07	8.886E-10	4.068E-09	1.33E-11	2.58E-04	11
1.0000	3.496E+05	2.6436E+05	2.5659E+13	25.8	5.35E-07	3.768E-10	1.725E-09	5.94E-12	2.58E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	2.2604	2.1604	2.0596	1.9726	1.8676	1.7629	1.6849	1.6246
3	2.4710	2.3374	2.2112	2.1052	1.9795	1.8561	1.7653	1.6955
4	2.5921	2.4390	2.2982	2.1813	2.0437	1.9095	1.8113	1.7361
5	2.6776	2.5107	2.3597	2.2352	2.0893	1.9476	1.8442	1.7652
6	2.7436	2.5661	2.4072	2.2768	2.1246	1.9771	1.8697	1.7878
7	2.7934	2.6068	2.4413	2.3060	2.1485	1.9963	1.8857	1.8015
8	2.8358	2.6415	2.4704	2.3311	2.1692	2.0130	1.8997	1.8135
9	2.8727	2.6718	2.4960	2.3531	2.1874	2.0278	1.9121	1.8242
10	2.9054	2.6987	2.5187	2.3727	2.2037	2.0411	1.9233	1.8339
11	2.9347	2.7229	2.5391	2.3904	2.2184	2.0530	1.9334	1.8426
12	2.9612	2.7448	2.5577	2.4064	2.2318	2.0640	1.9427	1.8426

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360	1.0360
2	1.5556	1.4889	1.4199	1.3529	1.2863	1.2175	1.1515
3	1.6165	1.5406	1.4628	1.3878	1.3138	1.2380	1.1657
4	1.6512	1.5700	1.4869	1.4071	1.3287	1.2487	1.1725
5	1.6761	1.5911	1.5043	1.4212	1.3396	1.2564	1.1775
6	1.6955	1.6076	1.5179	1.4321	1.3481	1.2626	1.1775
7	1.7067	1.6165	1.5247	1.4370	1.3512	1.2626	1.1775
8	1.7166	1.6245	1.5247	1.4370	1.3512	1.2626	1.1775
9	1.7254	1.6245	1.5247	1.4370	1.3512	1.2626	1.1775
10	1.7334	1.6245	1.5247	1.4370	1.3512	1.2626	1.1775
11	1.7334	1.6245	1.5247	1.4370	1.3512	1.2626	1.1775
12	1.7334	1.6245	1.5247	1.4370	1.3512	1.2626	1.1775

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18895E-17	0.33413E-17	0.52363E-17	0.75764E-17	0.11922E-16	0.19280E-16	0.28423E-16	0.39355E-16
2	0.41225E-17	0.69675E-17	0.10409E-16	0.14425E-16	0.21492E-16	0.32805E-16	0.46225E-16	0.61710E-16
3	0.45066E-17	0.75384E-17	0.11176E-16	0.15395E-16	0.22780E-16	0.34539E-16	0.48429E-16	0.64406E-16
4	0.47275E-17	0.78659E-17	0.11615E-16	0.15951E-16	0.23518E-16	0.35533E-16	0.49692E-16	0.65948E-16
5	0.48835E-17	0.80972E-17	0.11926E-16	0.16345E-16	0.24043E-16	0.36242E-16	0.50594E-16	0.67053E-16
6	0.50039E-17	0.82759E-17	0.12167E-16	0.16650E-16	0.24450E-16	0.36792E-16	0.51295E-16	0.67912E-16
7	0.50947E-17	0.84070E-17	0.12339E-16	0.16863E-16	0.24725E-16	0.37149E-16	0.51734E-16	0.68431E-16
8	0.51720E-17	0.85190E-17	0.12486E-16	0.17047E-16	0.24963E-16	0.37460E-16	0.52118E-16	0.68888E-16
9	0.52393E-17	0.86168E-17	0.12615E-16	0.17208E-16	0.25172E-16	0.37735E-16	0.52459E-16	0.69294E-16
10	0.52989E-17	0.87035E-17	0.12730E-16	0.17351E-16	0.25359E-16	0.37982E-16	0.52765E-16	0.69661E-16
11	0.53523E-17	0.87814E-17	0.12833E-16	0.17480E-16	0.25528E-16	0.38205E-16	0.53043E-16	0.69994E-16
12	0.54007E-17	0.88521E-17	0.12927E-16	0.17598E-16	0.25682E-16	0.38409E-16	0.53298E-16	0.69994E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.59103E-16	0.91693E-16	0.15399E-15	0.27760E-15	0.56409E-15	0.14388E-14	0.50445E-14
2	0.88743E-16	0.13177E-15	0.21104E-15	0.36250E-15	0.70033E-15	0.16908E-14	0.56067E-14
3	0.92216E-16	0.13635E-15	0.21741E-15	0.37185E-15	0.71532E-15	0.17193E-14	0.56759E-14
4	0.94197E-16	0.13895E-15	0.22100E-15	0.37704E-15	0.72345E-15	0.17341E-14	0.57090E-14
5	0.95619E-16	0.14082E-15	0.22359E-15	0.38080E-15	0.72936E-15	0.17449E-14	0.57334E-14
6	0.96727E-16	0.14228E-15	0.22561E-15	0.38374E-15	0.73400E-15	0.17534E-14	0.57334E-14
7	0.97364E-16	0.14307E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14
8	0.97928E-16	0.14377E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14
9	0.98432E-16	0.14377E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14
10	0.98889E-16	0.14377E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14
11	0.98889E-16	0.14377E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14
12	0.98889E-16	0.14377E-15	0.22661E-15	0.38503E-15	0.73570E-15	0.17534E-14	0.57334E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0002	0.0431	99.9999	5.354	0.0001	95.4010	1.958	4.5990
3.500E-07	1.414	0.400	0.4056	0.3922	99.9999	5.575	0.0001	99.9791	5.386	0.0209
4.500E-07	1.320	0.600	0.6083	0.4338	99.9999	5.910	0.0001	99.9846	5.580	0.0154
5.500E-07	1.261	1.667	1.6583	0.6552	99.9999	6.289	0.0001	99.9916	5.968	0.0084
7.000E-07	1.205	5.000	4.9739	1.2438	99.9999	6.890	0.0001	99.9947	6.258	0.0053
9.000E-07	1.159	4.933	5.0016	1.2395	99.9999	7.711	0.0001	99.9946	6.252	0.0054
1.100E-06	1.130	4.733	4.7083	1.4342	99.9999	8.535	0.0001	99.9935	6.133	0.0065
1.300E-06	1.110	4.000	3.9791	1.6435	99.9999	9.316	0.0001	99.9912	5.939	0.0088
1.600E-06	1.090	8.000	7.9583	3.7733	99.9999	10.495	0.0001	99.9899	5.852	0.0101
2.000E-06	1.072	6.667	6.6322	4.1670	99.9999	12.006	0.0001	99.9867	5.673	0.0133
2.600E-06	1.055	10.667	10.8154	8.6528	99.9999	14.332	0.0001	99.9827	5.507	0.0173
3.500E-06	1.041	10.667	10.8154	10.2733	99.9999	17.846	0.0001	99.9795	5.398	0.0205
5.000E-06	1.029	11.333	11.2739	16.8236	99.9999	23.587	0.0001	99.9683	5.123	0.0317
8.000E-06	1.018	12.000	11.9374	20.8074	99.9999	34.767	0.0001	99.9630	5.024	0.0370
1.500E-05	1.010	19.333	19.2320	28.4173	99.9999	60.132	0.0001	99.9686	5.129	0.0314

EFFICIENCY = STATED = 99.99 COMPUTED = 99.9991 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9999
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.296E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.788

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.9787
CORRECTED MMD OF EFFLUENT = 5.829E+00
CORRECTED SIGMAP OF EFFLUENT = 2.678E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 5.37

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.739E+00	9.994E+01	4.250E-10	1.951E-05	1.951E-05	4.360E-02	2.500E-07
4.991E+00	9.996E+01	1.198E-06	6.446E-05	6.566E-05	1.022E-01	3.500E-07
5.340E+00	9.998E+01	2.317E-06	1.450E-04	1.473E-04	1.784E-01	4.500E-07
5.725E+00	9.999E+01	7.730E-06	2.628E-04	2.706E-04	2.642E-01	5.500E-07
6.329E+00	1.000E+02	1.469E-05	5.015E-04	5.162E-04	7.953E-01	7.000E-07
7.151E+00	1.000E+02	1.905E-05	9.207E-04	9.397E-04	1.132E+00	9.000E-07
8.535E+00	1.000E+02	2.195E-05	1.417E-03	1.439E-03	1.424E+00	1.100E-06
9.316E+00	1.000E+02	2.194E-05	1.955E-03	1.977E-03	1.661E+00	1.300E-06
1.049E+01	1.000E+02	2.691E-05	2.765E-03	2.792E-03	3.831E+00	1.600E-06
1.201E+01	1.000E+02	2.809E-05	3.827E-03	3.855E-03	4.234E+00	2.000E-06
1.433E+01	1.000E+02	2.963E-05	5.142E-03	5.172E-03	8.791E+00	2.600E-06
1.785E+01	1.000E+02	3.195E-05	6.582E-03	6.614E-03	1.044E+01	3.500E-06
2.359E+01	1.000E+02	2.363E-05	7.648E-03	7.671E-03	1.709E+01	5.000E-06
3.477E+01	1.000E+02	1.986E-05	7.507E-03	7.527E-03	2.114E+01	8.000E-06
6.013E+01	1.000E+02	2.358E-05	7.556E-03	7.580E-03	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.9787 % SCA = 1.573E+02 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.515E+04 V

AVG. CURRENT DENSITY = 25.81 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 5.829E+00 UM OUTLET SIGMAP = 2.678E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX G

OUTPUT DATA FROM EXAMPLE 7

```
**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 197A      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  1

DATA ON CARD NUMBER   2

LAB ESP; SCA=125 FT2/1000ACFM; J=2 NA/CM2

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  1  NX = 10  NY = 10  NITER =  3  NCALC =  0  NRAPD =  1  NEFF =  1  NTEMP =  1  NONID =  1

DATA ON CARD NUMBER   4

NN = 10  NUMINC = 20

DATA ON CARD NUMBER   5

DL =  0.01500 GRN/ACF  PL =  10.0000 FT  ETAD = 99.00000 %  DD =  1000.00 KG/M**3  EPS =  5.100E+00
VRATIO =   1.0300  US = 0.000165 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  1.00E+09 OHM-CM

DATA ON CARD NUMBER   6

ASNUCK( 1) = 0.00  AZIGGV( 1) = 0.00  AZNUMS( 1) =  4.0

DATA ON CARD NUMBER   7

ENDPT( 1) =    0.200 UM   ENDPT( 2) =    0.300 UM   ENDPT( 3) =    0.400 UM   ENDPT( 4) =    0.500 UM   ENDPT( 5) =    0.600 UM
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ENDPT(6) = 0.800 UM ENDPT(7) = 1.000 UM ENDPT(8) = 1.200 UM ENDPT(9) = 1.400 UM ENDPT(10) = 1.800 UM

DATA ON CARD NUMBER 8

ENDPT(11) = 2.200 UM ENDPT(12) = 3.000 UM ENDPT(13) = 4.000 UM ENDPT(14) = 6.000 UM ENDPT(15) = 10.000 UM
ENDPT(16) = 20.000 UM

DATA ON CARD NUMBER 9

PRCU(1) = 0.0000 % PRCU(2) = 0.0002 % PRCU(3) = 0.4002 % PRCU(4) = 1.0002 % PRCU(5) = 2.6672 %
PRCU(6) = 7.6672 % PRCU(7) = 12.6002 % PRCU(8) = 17.3332 % PRCU(9) = 21.3332 % PRCU(10) = 29.3332 %

DATA ON CARD NUMBER 10

PRCU(11) = 36.0002 % PRCU(12) = 46.6672 % PRCU(13) = 57.3342 % PRCU(14) = 68.6672 % PRCU(15) = 80.6672 %
PRCU(16) = 100.0000 %

DATA ON CARD NUMBER 11

NUMSEC = 3 LSECT(1) = 3 LSECT(2) = 3 LSECT(3) = 6

DATA ON CARD NUMBER 12

AS(1) = 6.2500E+00 FT**2 VOS(1) = 3.7500E+04 V TCS(1) = 1.1628E-05 A WLS(1) = 6.2500E+00 FT
ACS(1) = 4.6875E-02 IN BS(1) = 5.0000E+00 IN NWS(1) = 5.0000E+00

DATA ON CARD NUMBER 13

SYS(1) = 2.5000E+00 IN VGS(1) = 2.0000E+02 FT**3/MIN VGABS(1) = 3.2000E+00 FT/SEC TEMPS(1) = 7.6800E+01 F
PS(1) = 1.0000E+00 ATM VISS(1) = 1.8000E-05 KG/M-SEC LINCS(1) = 8.3333E-01 FT

DATA ON CARD NUMBER 14

AS(2) = 6.2500E+00 FT**2 VOS(2) = 3.7000E+04 V TCS(2) = 1.1628E-05 A WLS(2) = 6.2500E+00 FT
ACS(2) = 4.6875E-02 IN BS(2) = 5.0000E+00 IN NWS(2) = 5.0000E+00

DATA ON CARD NUMBER 15

SYS(2) = 2.5000E+00 IN VGS(2) = 2.0000E+02 FT**3/MIN VGASS(2) = 3.2000E+00 FT/SEC TEMPS(2) = 7.6800E+01 F
PS(2) = 1.0000E+00 ATM VISS(2) = 1.8000E-05 KG/M-SEC LINCS(2) = 8.3333E-01 FT

DATA ON CARD NUMBER 16

AS(3) = 1.2500E+01 FT**2 VOS(3) = 3.4900E+04 V TCS(3) = 2.3256E-05 A WLS(3) = 1.2500E+01 FT
ACS(3) = 4.6875E-02 IN BS(3) = 5.0000E+00 IN NWS(3) = 1.0000E+01

DATA ON CARD NUMBER 17

SYS(3) = 2.5000E+00 IN VGS(3) = 2.0000E+02 FT**3/MIN VGASS(3) = 3.2000E+00 FT/SEC TEMPS(3) = 7.6800E+01 F
PS(3) = 1.0000E+00 ATM VISS(3) = 1.8000E-05 KG/M-SEC LINCS(3) = 8.3333E-01 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=2 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.750E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.9041	2.953E+05	1.8258E+05	1.2368E+12	2.0	7.57E-06	1.770E-06	5.186E-05	1.80E-09	2.00E-05	1
1.6014	2.953E+05	1.8148E+05	1.4706E+12	2.0	7.09E-06	2.716E-06	7.957E-05	4.92E-09	2.00E-05	2
1.3937	2.953E+05	1.8030E+05	1.6897E+12	2.0	6.31E-06	3.055E-06	8.949E-05	8.23E-09	2.00E-05	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.700E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2515	2.913E+05	1.7714E+05	1.9072E+12	2.0	5.32E-06	2.979E-06	8.728E-05	1.12E-08	2.00E-05	4
1.1615	2.913E+05	1.7662E+05	2.0550E+12	2.0	4.49E-06	2.773E-06	8.123E-05	1.40E-08	2.00E-05	5
1.1030	2.913E+05	1.7627E+05	2.1641E+12	2.0	3.82E-06	2.498E-06	7.317E-05	1.59E-08	2.00E-05	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.490E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.326E-05 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 31.87

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0616	2.748E+05	1.6667E+05	2.3837E+12	2.0	3.34E-06	2.083E-06	6.101E-05	1.56E-08	2.00E-05	7
1.0391	2.748E+05	1.6652E+05	2.4352E+12	2.0	3.04E-06	1.812E-06	5.309E-05	1.55E-08	2.00E-05	8
1.0248	2.748E+05	1.6644E+05	2.4692E+12	2.0	2.75E-06	1.564E-06	4.583E-05	1.51E-08	2.00E-05	9

1.0158	2.748E+05	1.6644E+05	2.4912E+12	2.0	2.51E-06	1.351E-06	3.958E-05	1.45E-08	2.00E-05	10
1.0100	2.748E+05	1.6644E+05	2.5054E+12	2.0	2.35E-06	1.172E-06	3.433E-05	1.38E-08	2.00E-05	11
1.0063	2.748E+05	1.6644E+05	2.5145E+12	2.0	2.20E-06	1.023E-06	2.997E-05	1.31E-08	2.00E-05	12

EST. EFFICIENCY = 99.00 UNCORRECTED COMPUTED EFFICIENCY = 72.19

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=2 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.750E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10,12

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2870	2.953E+05	1.7968E+05	1.8299E+12	2.0	7.55E-06	2.301E-06	6.740E-05	3.05E-09	2.00E-05	1
1.2500	2.953E+05	1.7946E+05	1.8840E+12	2.0	6.89E-06	3.1[illegible]E-06	9.185E-05	7.10E-09	2.00E-05	2
1.2143	2.953E+05	1.7926E+05	1.9394E+12	2.0	5.96E-06	3.2[illegible]E-06	9.543E-05	1.06E-08	2.00E-05	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.700E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10,12

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1794	2.913E+05	1.7672E+05	2.0238E+12	2.0	4.91E-06	3.024E-06	8.858E-05	1.35E-08	2.00E-05	4
1.1511	2.913E+05	1.7656E+05	2.0736E+12	2.0	4.18E-06	2.726E-06	7.987E-05	1.57E-08	2.00E-05	5
1.1265	2.913E+05	1.7642E+05	2.1187E+12	2.0	3.54E-06	2.401E-06	7.034E-05	1.68E-08	2.00E-05	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.490E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.326E-05 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10,12

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0996	2.748E+05	1.6692E+05	2.3012E+12	2.0	3.19E-06	1.966E-06	5.759E-05	1.59E-08	2.00E-05	7
1.0834	2.748E+05	1.6681E+05	2.3357E+12	2.0	2.89E-06	1.694E-06	4.963E-05	1.55E-08	2.00E-05	8
1.0698	2.748E+05	1.6672E+05	2.3654E+12	2.0	2.61E-06	1.457E-06	4.268E-05	1.48E-08	2.00E-05	9
1.0584	2.748E+05	1.6665E+05	2.3908E+12	2.0	2.43E-06	1.258E-06	3.687E-05	1.41E-08	2.00E-05	10
1.0489	2.748E+05	1.6665E+05	2.4125E+12	2.0	2.27E-06	1.094E-06	3.206E-05	1.34E-08	2.00E-05	11
1.0410	2.748E+05	1.6665E+05	2.4309E+12	2.0	2.13E-06	9.583E-07	2.807E-05	1.27E-08	2.00E-05	12

EST. EFFICIENCY = 72.19 UNCORRECTED COMPUTED EFFICIENCY = 73.57

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125 FT2/1000ACFM; J=2 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.750E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.50

RDVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.2978	2.953E+05	1.7975E+05	1.8146E+12	2.0	7.55E-06	2.288E-06	6.704E-05	3.02E-09	2.00E-05	1
1.2584	2.953E+05	1.7951E+05	1.8714E+12	2.0	6.89E-06	3.125E-06	9.156E-05	7.04E-09	2.00E-05	2
1.2206	2.953E+05	1.7930E+05	1.9294E+12	2.0	5.97E-06	3.252E-06	9.527E-05	1.06E-08	2.00E-05	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.700E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.50

RDVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1839	2.913E+05	1.7675E+05	2.0161E+12	2.0	4.92E-06	3.022E-06	8.852E-05	1.34E-08	2.00E-05	4
1.1543	2.913E+05	1.7658E+05	2.0679E+12	2.0	4.19E-06	2.726E-06	7.987E-05	1.56E-08	2.00E-05	5
1.1287	2.913E+05	1.7644E+05	2.1147E+12	2.0	3.55E-06	2.402E-06	7.038E-05	1.68E-08	2.00E-05	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 6.100E-06 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 3.490E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC

TOTAL CURRENT = 2.326E-05 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M

DUST WEIGHT = 3.250E-06 KG/SEC LENGTH INCR. =0.25416565 M INPUT EFF./INCR. = 10.50

ROVRI	FRAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1009	2.748E+05	1.6693E+05	2.2986E+12	2.0	3.19E-06	1.968E-06	5.766E-05	1.59E-08	2.00E-05	7
1.0841	2.748E+05	1.6682E+05	2.3342E+12	2.0	2.89E-06	1.697E-06	4.971E-05	1.55E-08	2.00E-05	8
1.0701	2.748E+05	1.6674E+05	2.3648E+12	2.0	2.61E-06	1.460E-06	4.277E-05	1.48E-08	2.00E-05	9
1.0584	2.748E+05	1.6665E+05	2.3909E+12	2.0	2.43E-06	1.261E-06	3.694E-05	1.41E-08	2.00E-05	10
1.0487	2.748E+05	1.6665E+05	2.4130E+12	2.0	2.27E-06	1.096E-06	3.212E-05	1.34E-08	2.00E-05	11
1.0406	2.748E+05	1.6665E+05	2.4317E+12	2.0	2.13E-06	9.600E-07	2.812E-05	1.27E-08	2.00E-05	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.5242	0.5111	0.4923	0.4743	0.4516	0.4286	0.4118	0.3991
2	0.8055	0.7877	0.7610	0.7358	0.7043	0.6727	0.6496	0.6319
3	1.0345	1.0198	0.9883	0.9563	0.9149	0.8723	0.8404	0.8156
4	1.2301	1.2219	1.1939	1.1625	1.1171	1.0624	1.0167	0.9813
5	1.3706	1.3609	1.3318	1.3002	1.2567	1.2079	1.1675	1.1329
6	1.4793	1.4652	1.4320	1.3974	1.3509	1.3003	1.2602	1.2274
7	1.5646	1.5430	1.5036	1.4640	1.4119	1.3562	1.3127	1.2777
8	1.6363	1.6078	1.5626	1.5184	1.4611	1.4006	1.3538	1.3166
9	1.6980	1.6630	1.6126	1.5642	1.5021	1.4373	1.3875	1.3480
10	1.7520	1.7111	1.6558	1.6037	1.5373	1.4685	1.4159	1.3744
11	1.8001	1.7537	1.6939	1.6383	1.5680	1.4955	1.4404	1.3970
12	1.8433	1.7917	1.7279	1.6690	1.5952	1.5193	1.4619	1.4168

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.3852	0.3725	0.3601	0.3489	0.3386	0.3286	0.3195
2	0.6121	0.5933	0.5742	0.5562	0.5387	0.5209	0.5041
3	0.7875	0.7605	0.7329	0.7064	0.6805	0.6541	0.6291
4	0.9411	0.9027	0.8636	0.8264	0.7901	0.7535	0.7193
5	1.0877	1.0357	0.9815	0.9308	0.8822	0.8340	0.7898
6	1.1874	1.1449	1.0933	1.0288	0.9649	0.9030	0.8476
7	1.2360	1.1933	1.1448	1.0918	1.0411	0.9673	0.8942
8	1.2727	1.2286	1.1801	1.1300	1.0835	1.0253	0.9369
9	1.3020	1.2561	1.2067	1.1568	1.1106	1.0583	0.9774
10	1.3262	1.2785	1.2278	1.1772	1.1300	1.0789	1.0142
11	1.3468	1.2975	1.2452	1.1937	1.1451	1.0936	1.0358
12	1.3648	1.3137	1.2600	1.2073	1.1574	1.1049	1.0494

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.75143E-18	0.12956E-17	0.19557E-17	0.27264E-17	0.40847E-17	0.62694E-17	0.88802E-17	0.11918E-16
2	0.11548E-17	0.19967E-17	0.30235E-17	0.42295E-17	0.63706E-17	0.98404E-17	0.14008E-16	0.18868E-16
3	0.14830E-17	0.25851E-17	0.39262E-17	0.54970E-17	0.82761E-17	0.12760E-16	0.18122E-16	0.24353E-16
4	0.17634E-17	0.30974E-17	0.47430E-17	0.66820E-17	0.10105E-16	0.15540E-16	0.21924E-16	0.29299E-16
5	0.19648E-17	0.34499E-17	0.52908E-17	0.74740E-17	0.1136AE-16	0.17668E-16	0.25178E-16	0.33826E-16
6	0.21207E-17	0.37142E-17	0.56891E-17	0.80325E-17	0.12219E-16	0.19020E-16	0.27176E-16	0.36647E-16
7	0.22430E-17	0.39116E-17	0.59736E-17	0.84155E-17	0.12771E-16	0.19838E-16	0.28308E-16	0.38150E-16
8	0.23457E-17	0.40757E-17	0.62078E-17	0.87280E-17	0.13216E-16	0.20487E-16	0.29195E-16	0.39310E-16
9	0.24342E-17	0.42158E-17	0.64063E-17	0.89913E-17	0.13587E-16	0.21024E-16	0.29921E-16	0.40250E-16
10	0.25117E-17	0.43378E-17	0.65782E-17	0.92181E-17	0.13906E-16	0.21480E-16	0.30533E-16	0.41038E-16
11	0.25806E-17	0.44456E-17	0.67295E-17	0.94170E-17	0.14183E-16	0.21875E-16	0.31061E-16	0.41713E-16
12	0.26425E-17	0.45420E-17	0.68644E-17	0.95938E-17	0.14429E-16	0.22224E-16	0.31525E-16	0.42303E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.17274E-16	0.25912E-16	0.42069E-16	0.73493E-16	0.14493E-15	0.35869E-15	0.12230E-14
2	0.27446E-16	0.41272E-16	0.67087E-16	0.11715E-15	0.23055E-15	0.56861E-15	0.19293E-14
3	0.35312E-16	0.52905E-16	0.85620E-16	0.14878E-15	0.29124E-15	0.71401E-15	0.24077E-14
4	0.42199E-16	0.62795E-16	0.10089E-15	0.17404E-15	0.33816E-15	0.82258E-15	0.27529E-14
5	0.48775E-16	0.72050E-16	0.11466E-15	0.19603E-15	0.37756E-15	0.91045E-15	0.30227E-14
6	0.53246E-16	0.79649E-16	0.12772E-15	0.21669E-15	0.41294E-15	0.98573E-15	0.32439E-14
7	0.55425E-16	0.83013E-16	0.13375E-15	0.22994E-15	0.44557E-15	0.10560E-14	0.34223E-14
8	0.57069E-16	0.85466E-16	0.13787E-15	0.23799E-15	0.46372E-15	0.11193E-14	0.35857E-14
9	0.58381E-16	0.87381E-16	0.14097E-15	0.24364E-15	0.47529E-15	0.11552E-14	0.37408E-14
10	0.59469E-16	0.88944E-16	0.14344E-15	0.24795E-15	0.48363E-15	0.11777E-14	0.38818E-14
11	0.60394E-16	0.90260E-16	0.14548E-15	0.25141E-15	0.49009E-15	0.11938E-14	0.39642E-14
12	0.61197E-16	0.91393E-16	0.14721E-15	0.25429E-15	0.49534E-15	0.12062E-14	0.40161E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0005	0.0004	51.9261	2.980	48.0739	51.9261	2.980	48.0739
3.500E-07	1.414	0.400	0.9772	0.8563	52.9604	3.069	47.0396	52.1708	3.001	47.8292
4.500E-07	1.320	0.600	1.4187	1.2472	54.4738	3.202	45.5262	53.5552	3.120	46.4448
5.500E-07	1.261	1.667	3.7832	3.2967	56.3028	3.369	43.6972	55.8131	3.323	44.1869
7.000E-07	1.205	5.000	10.7249	9.3523	58.6994	3.598	41.3006	58.2079	3.550	41.7921
9.000E-07	1.159	4.933	9.7849	8.5889	61.8074	3.916	38.1926	61.0980	3.841	38.9020
1.100E-06	1.130	4.733	8.7391	7.7279	64.4481	4.208	35.5519	63.5185	4.103	36.4815
1.300E-06	1.110	4.000	6.8907	6.1679	66.8308	4.490	33.1692	65.5475	4.336	34.4525
1.600E-06	1.090	8.000	12.5909	11.3802	69.6960	4.858	30.3040	68.2162	4.664	31.7838
2.000E-06	1.072	6.667	9.3922	8.6793	72.8752	5.309	27.1248	70.9129	5.024	29.0871
2.600E-06	1.055	10.667	12.9388	12.3660	76.6448	5.917	23.3552	74.0981	5.496	25.9019
3.500E-06	1.041	10.667	10.7806	10.7338	80.5404	6.660	19.4596	77.5168	6.072	22.4832
5.000E-06	1.029	11.333	8.1751	9.4090	86.1108	8.032	13.8892	81.4500	6.855	18.5500
8.000E-06	1.018	12.000	3.2315	5.7084	94.8150	12.041	5.1850	89.3713	9.121	10.6287
1.500E-05	1.010	19.333	0.5718	4.4858	99.4305	21.029	0.5695	94.8157	12.042	5.1843

EFFICIENCY = STATED = 73.57 COMPUTED = 73.5327 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 80.7455
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.763E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.780E+00
LOG-NORMAL GOODNESS OF FIT = 0.958
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.703

SIGMAG= 0.000 WITH 0.000 %NEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 77.6567
CORRECTED MMD OF EFFLUENT = 2.150E+00
CORRECTED SIGMAP OF EFFLUENT = 1.964E+00
LOG-NORMAL GOODNESS OF FIT = 0.948
CORRECTED PRECIPITATION RATE PARAMETER = 6.10

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
1.282E+00	2.702E+01	2.049E-04	2.871E-03	3.076E-03	4.360E-02	2.500E-07
1.414E+00	2.936E+01	5.651E-01	9.487E-03	5.746E-01	1.022E-01	3.500E-07
1.562E+00	3.188E+01	1.058E+00	2.134E-02	1.079E+00	1.784E-01	4.500E-07
1.714E+00	3.438E+01	3.452E+00	3.869E-02	3.491E+00	2.642E-01	5.500E-07
1.945E+00	3.800E+01	6.202E+00	7.381E-02	6.276E+00	7.953E-01	7.000E-07
2.251E+00	4.249E+01	7.295E+00	1.355E-01	7.431E+00	1.132E+00	9.000E-07
2.553E+00	4.661E+01	7.974E+00	2.085E-01	8.183E+00	1.424E+00	1.100E-06
2.853E+00	5.040E+01	7.437E+00	2.877E-01	7.725E+00	1.661E+00	1.300E-06
3.296E+00	5.551E+01	8.335E+00	4.070E-01	8.742E+00	3.831E+00	1.600E-06
3.875E+00	6.142E+01	7.787E+00	5.633E-01	8.350E+00	4.234E+00	2.000E-06
4.726E+00	6.870E+01	6.940E+00	7.568E-01	7.697E+00	8.791E+00	2.600E-06
5.973E+00	7.696E+01	6.235E+00	9.687E-01	7.203E+00	1.044E+01	3.500E-06
8.032E+00	8.611E+01	3.354E+00	1.126E+00	4.480E+00	1.709E+01	5.000E-06
1.204E+01	9.481E+01	1.052E+00	1.105E+00	2.157E+00	2.114E+01	8.000E-06
2.103E+01	9.943E+01	1.372E-01	1.112E+00	1.249E+00	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 77.6567 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.607E+04 V

AVG. CURRENT DENSITY = 2.00 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.150E+00 UM OUTLET SIGMAP = 1.964E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION 1,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  4

DATA ON CARD NUMBER   2

LAB ESP: SCA=125 FT2/1000ACFM; J=5 NA/CM2

DATA ON CARD NUMBER   3

VOS( 1) =  3.9450E+04 V  TCS( 1) =  2.9070E-05 A
VOS( 2) =  3.9000E+04 V  TCS( 2) =  2.9070E-05 A
VOS( 3) =  3.7200E+04 V  TCS( 3) =  5.8140E-05 A
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=5 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.945E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.907E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1253	3.106E+05	1.9720E+05	4.9733E+12	5.0	7.26E-06	4.623E-06	1.354E-04	1.23E-08	5.00E-05	1
1.1051	3.106E+05	1.9693E+05	5.0645E+12	5.0	5.81E-06	4.877E-06	1.429E-04	2.29E-08	5.00E-05	2
1.0860	3.106E+05	1.9667E+05	5.1533E+12	5.0	4.53E-06	4.215E-06	1.235E-04	2.74E-08	5.00E-05	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.900E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.907E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0690	3.071E+05	1.9435E+05	5.2958E+12	5.0	3.76E-06	3.335E-06	9.771E-05	2.71E-08	5.00E-05	4
1.0559	3.071E+05	1.9418E+05	5.3612E+12	5.0	3.15E-06	2.619E-06	7.671E-05	2.56E-08	5.00E-05	5
1.0454	3.071E+05	1.9405E+05	5.4153E+12	5.0	2.70E-06	2.076E-06	6.081E-05	2.38E-08	5.00E-05	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.720E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 10.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0352	2.929E+05	1.8594E+05	5.7333E+12	5.0	2.41E-06	1.610E-06	4.716E-05	2.10E-08	5.00E-05	7
1.0288	2.929E+05	1.8594E+05	5.7692E+12	5.0	2.22E-06	1.338E-06	3.919E-05	1.93E-08	5.00E-05	8
1.0235	2.929E+05	1.8594E+05	5.7986E+12	5.0	2.05E-06	1.130E-06	3.310E-05	1.78E-08	5.00E-05	9

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1.0193   2.929E+05  1.8594E+05  5.8229E+12      5.0   1.90E-06   9.659E-07   2.830E-05   1.65E-08      5.00E-05       10
1.0158   2.929E+05  1.8594E+05  5.8428E+12      5.0   1.77E-06   8.331E-07   2.441E-05   1.52E-08      5.00E-05       11
1.0130   2.929E+05  1.8594E+05  5.8592E+12      5.0   1.66E-06   7.238E-07   2.121E-05   1.40E-08      5.00E-05       12

EST. EFFICIENCY = 73.57      UNCORRECTED COMPUTED EFFICIENCY = 82.52


INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE


LAB ESP: SCA=125 FT2/1000ACFM; J=5 NA/CM2


CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS =  0.7625 M

COLLECTION AREA =  5.812E-01 M2          APPLIED VOLTAGE =  3.945E+04 VOLTS        TOTAL CURRENT =  2.907E-05 AMPS
WIRE TO PLATE =  1.270E-01 M             CORONA WIRE RADIUS =  1.191E-03 M         CORONA WIRE LENGTH =  1.906E+00 M
CURRENT/M =  1.525E-05 AMP/M             CURRENT DENSITY =  5.001E-05 AMP/M2       DEPOSIT E FIELD =  5.001E+02 VOLT/M
1/2 WIRE TO WIRE =  6.350E-02 M          GAS FLOW RATE =  9.460E-02 M3/SEC         GAS VELOCITY =  9.760E-01 M/SEC
TEMPERATURE = 297.667 K                  PRESSURE =  1.000 ATM                     VISCOSITY =  1.800E-05 KG/M-SEC
ION MOBILITY =  1.798E-04 M2/VOLT-SEC    MEAN THERMAL SPEED =  4.439E+02 M/SEC     PART. PATH PARAM. =  5.708E-08 M
DUST WEIGHT =  3.250E-06 KG/SEC          LENGTH INCR. =0.25416565 M                INPUT EFF./INCR. = 13.53

ROVRI    ERAVG       EPLT        AFID       CMCD      MMD        WEIGHT     DUST LAYER   J(PART)      J(ION)     INCR. NO.

1.1615   3.106E+05  1.9768E+05  4.8185E+12      5.0   7.27E-06   4.564E-06   1.337E-04   1.19E-08      5.00E-05       1
1.1309   3.106E+05  1.9728E+05  4.9487E+12      5.0   5.85E-06   4.849E-06   1.421E-04   2.24E-08      5.00E-05       2
1.1037   3.106E+05  1.9692E+05  5.0709E+12      5.0   4.55E-06   4.213E-06   1.234E-04   2.71E-08      5.00E-05       3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS =  0.7625 M

COLLECTION AREA =  5.812E-01 M2          APPLIED VOLTAGE =  3.900E+04 VOLTS        TOTAL CURRENT =  2.907E-05 AMPS
WIRE TO PLATE =  1.270E-01 M             CORONA WIRE RADIUS =  1.191E-03 M         CORONA WIRE LENGTH =  1.906E+00 M
CURRENT/M =  1.525E-05 AMP/M             CURRENT DENSITY =  5.001E-05 AMP/M2       DEPOSIT E FIELD =  5.001E+02 VOLT/M
1/2 WIRE TO WIRE =  6.350E-02 M          GAS FLOW RATE =  9.460E-02 M3/SEC         GAS VELOCITY =  9.760E-01 M/SEC
TEMPERATURE = 297.667 K                  PRESSURE =  1.000 ATM                     VISCOSITY =  1.800E-05 KG/M-SEC
ION MOBILITY =  1.798E-04 M2/VOLT-SEC    MEAN THERMAL SPEED =  4.439E+02 M/SEC     PART. PATH PARAM. =  5.708E-08 M
DUST WEIGHT =  3.250E-06 KG/SEC          LENGTH INCR. =0.25416565 M                INPUT EFF./INCR. = 13.53

ROVRI    ERAVG       EPLT        AFID       CMCD      MMD        WEIGHT     DUST LAYER   J(PART)      J(ION)     INCR. NO.

1.0804   3.071E+05  1.9452E+05  5.2401E+12      5.0   3.77E-06   3.347E-06   9.805E-05   2.69E-08      5.00E-05       4
1.0630   3.071E+05  1.9428E+05  5.3258E+12      5.0   3.17E-06   2.632E-06   7.710E-05   2.56E-08      5.00E-05       5
1.0494   3.071E+05  1.9410E+05  5.3947E+12      5.0   2.71E-06   2.087E-06   6.113E-05   2.38E-08      5.00E-05       6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS =  1.5250 M

COLLECTION AREA =  1.162E+00 M2          APPLIED VOLTAGE =  3.720E+04 VOLTS        TOTAL CURRENT =  5.814E-05 AMPS
WIRE TO PLATE =  1.270E-01 M             CORONA WIRE RADIUS =  1.191E-03 M         CORONA WIRE LENGTH =  3.812E+00 M
CURRENT/M =  1.525E-05 AMP/M             CURRENT DENSITY =  5.001E-05 AMP/M2       DEPOSIT E FIELD =  5.001E+02 VOLT/M
1/2 WIRE TO WIRE =  6.350E-02 M          GAS FLOW RATE =  9.460E-02 M3/SEC         GAS VELOCITY =  9.760E-01 M/SEC
TEMPERATURE = 297.667 K                  PRESSURE =  1.000 ATM                     VISCOSITY =  1.800E-05 KG/M-SEC
ION MOBILITY =  1.798E-04 M2/VOLT-SEC    MEAN THERMAL SPEED =  4.439E+02 M/SEC     PART. PATH PARAM. =  5.708E-08 M
DUST WEIGHT =  3.250E-06 KG/SEC          LENGTH INCR. =0.25416565 M                INPUT EFF./INCR. = 13.53

ROVRI    ERAVG       EPLT        AFID       CMCD      MMD        WEIGHT     DUST LAYER   J(PART)      J(ION)     INCR. NO.
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1.0370	2.929E+05	1.8597E+05	5.7234E+12	5.0	2.42E-06	1.618E-06	4.739E-05	2.10E-08	5.00E-05	7
1.0292	2.929E+05	1.8597E+05	5.7667E+12	5.0	2.22E-06	1.344E-06	3.937E-05	1.93E-08	5.00E-05	8
1.0231	2.929E+05	1.8597E+05	5.8011E+12	5.0	2.05E-06	1.135E-06	3.325E-05	1.78E-08	5.00E-05	9
1.0183	2.929E+05	1.8597E+05	5.8286E+12	5.0	1.91E-06	9.701E-07	2.842E-05	1.65E-08	5.00E-05	10
1.0145	2.929E+05	1.8597E+05	5.8504E+12	5.0	1.78E-06	8.366E-07	2.451E-05	1.52E-08	5.00E-05	11
1.0115	2.929E+05	1.8597E+05	5.8678E+12	5.0	1.66E-06	7.269E-07	2.129E-05	1.41E-08	5.00E-05	12

EST. EFFICIENCY = 82.52 UNCORRECTED COMPUTED EFFICIENCY = 82.45

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=5 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.945E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.907E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 13.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1611	3.106E+05	1.9768E+05	4.8199E+12	5.0	7.27E-06	4.565E-06	1.337E-04	1.19E-08	5.00E-05	1
1.1307	3.106E+05	1.9728E+05	4.9497E+12	5.0	5.85E-06	4.849E-06	1.421E-04	2.24E-08	5.00E-05	2
1.1035	3.106E+05	1.9691E+05	5.0716E+12	5.0	4.55E-06	4.213E-06	1.234E-04	2.72E-08	5.00E-05	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E+01 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.900E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.907E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 13.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0803	3.071E+05	1.9452E+05	5.2405E+12	5.0	3.77E-06	3.347E-06	9.805E-05	2.69E-08	5.00E-05	4
1.0629	3.071E+05	1.9427E+05	5.3260E+12	5.0	3.17E-06	2.632E-06	7.709E-05	2.56E-08	5.00E-05	5
1.0494	3.071E+05	1.9410E+05	5.3949E+12	5.0	2.71E-06	2.087E-06	6.113E-05	2.38E-08	5.00E-05	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E+01 M
CURRENT/M = 1.525E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 3.720E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 5.001E-05 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 5.001E+02 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M

DUST WEIGHT = 3.250E-06 KG/SEC LENGTH INCR. =0.25416565 M INPUT EFF./INCR. = 13.50

ROVRT	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0370	2.929E+05	1.8597E+05	5.7234E+12	5.0	2.42E-06	1.61AE-06	4.739E-05	2.10E-08	5.00E-05	7
1.0292	2.929E+05	1.8597E+05	5.7666E+12	5.0	2.22E-06	1.344E-06	3.937E-05	1.93E-08	5.00E-05	A
1.0231	2.929E+05	1.8597E+05	5.8011E+12	5.0	2.05E-06	1.135E-06	3.324E-05	1.78E-08	5.00E-05	9
1.01A3	2.929E+05	1.8597E+05	5.8285E+12	5.0	1.91E-06	9.701E-07	2.842E-05	1.65E-08	5.00E-05	10
1.0145	2.929E+05	1.8597E+05	5.8503E+12	5.0	1.78E-06	8.366E-07	2.451E-05	1.52E-08	5.00E-05	11
1.0115	2.929E+05	1.8597E+05	5.8677E+12	5.0	1.66E-06	7.269E-07	2.129E-05	1.41E-08	5.00E-05	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.8929	0.8778	0.8517	0.8264	0.7943	0.7618	0.7377	0.7192
2	1.3099	1.3048	1.2792	1.2506	1.2102	1.1638	1.1245	1.0898
3	1.5308	1.5159	1.4816	1.4461	1.3987	1.3479	1.3081	1.2761
4	1.6742	1.6471	1.6024	1.5586	1.5017	1.4420	1.3961	1.3599
5	1.7804	1.7425	1.6889	1.6380	1.5730	1.5058	1.4545	1.4143
6	1.8645	1.8172	1.7559	1.6990	1.6272	1.5536	1.4978	1.4542
7	1.9303	1.8734	1.8048	1.7422	1.6641	1.5846	1.5246	1.4779
8	1.9865	1.9215	1.8465	1.7790	1.6955	1.6110	1.5475	1.4982
9	2.0355	1.9632	1.8827	1.8110	1.7229	1.6340	1.5674	1.5158
10	2.0788	2.0002	1.9148	1.8393	1.7470	1.6543	1.5851	1.5314
11	2.1176	2.0333	1.9434	1.8646	1.7687	1.6725	1.6009	1.5454
12	2.1528	2.0632	1.9693	1.8875	1.7882	1.6889	1.6151	1.5581

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.6982	0.6780	0.6572	0.6369	0.6168	0.5964	0.5774
2	1.0437	0.9977	0.9511	0.9069	0.8641	0.8215	0.7823
3	1.2382	1.1993	1.1558	1.1065	1.0388	0.9652	0.9012
4	1.3176	1.2758	1.2314	1.1863	1.1380	1.0795	0.9879
5	1.3678	1.3222	1.2744	1.2271	1.1788	1.1271	1.0615
6	1.4040	1.3550	1.3040	1.2540	1.2036	1.1511	1.0953
7	1.4243	1.3721	1.3179	1.2650	1.2120	1.1568	1.0993
8	1.4416	1.3868	1.3299	1.2745	1.2192	1.1568	1.0993
9	1.4568	1.3996	1.3404	1.2829	1.2256	1.1568	1.0993
10	1.4702	1.4110	1.3498	1.2904	1.2313	1.1568	1.0993
11	1.4822	1.4212	1.3582	1.2971	1.2313	1.1568	1.0993
12	1.4931	1.4304	1.3658	1.3032	1.2313	1.1568	1.0993

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.13644E-17	0.23718E-17	0.36068E-17	0.50632E-17	0.76579E-17	0.11877E-16	0.16956E-16	0.22889E-16
2	0.20017E-17	0.35257E-17	0.54170E-17	0.76624E-17	0.11668E-16	0.18146E-16	0.25846E-16	0.34684E-16
3	0.23391E-17	0.40960E-17	0.62739E-17	0.88602E-17	0.13486E-16	0.21015E-16	0.30067E-16	0.40613E-16
4	0.25583E-17	0.44506E-17	0.67856E-17	0.95494E-17	0.14479E-16	0.22483E-16	0.32091E-16	0.43279E-16
5	0.27206E-17	0.47084E-17	0.71517E-17	0.10036E-16	0.15166E-16	0.23477E-16	0.33433E-16	0.45010E-16
6	0.28491E-17	0.49101E-17	0.74355E-17	0.10409E-16	0.15689E-16	0.24222E-16	0.34429E-16	0.46281E-16
7	0.29496E-17	0.50622E-17	0.76425E-17	0.10674E-16	0.16045E-16	0.24705E-16	0.35045E-16	0.47035E-16
8	0.30355E-17	0.51919E-17	0.78190E-17	0.10900E-16	0.16348E-16	0.25117E-16	0.35571E-16	0.47680E-16
9	0.31103E-17	0.53048E-17	0.79725E-17	0.11096E-16	0.16611E-16	0.25476E-16	0.36029E-16	0.48242E-16
10	0.31766E-17	0.54047E-17	0.81082E-17	0.11269E-16	0.16844E-16	0.25793E-16	0.36434E-16	0.48740E-16
11	0.32359E-17	0.54940E-17	0.82296E-17	0.11425E-16	0.17053E-16	0.26076E-16	0.36797E-16	0.49185E-16
12	0.32896E-17	0.55749E-17	0.83394E-17	0.11565E-16	0.17241E-16	0.26333E-16	0.37125E-16	0.49588E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.33372E-16	0.50277E-16	0.81834E-16	0.14297E-15	0.28136E-15	0.69399E-15	0.23554E-14
2	0.49886E-16	0.73983E-16	0.11844E-15	0.20359E-15	0.39421E-15	0.95592E-15	0.31913E-14
3	0.59180E-16	0.88933E-16	0.14394E-15	0.24839E-15	0.47390E-15	0.11231E-14	0.36766E-14
4	0.62979E-16	0.94605E-16	0.15334E-15	0.26631E-15	0.51914E-15	0.12561E-14	0.40300E-14
5	0.65374E-16	0.98041E-16	0.15870E-15	0.27547E-15	0.53775E-15	0.13114E-14	0.43304E-14
6	0.67106E-16	0.10048E-15	0.16239E-15	0.28151E-15	0.54908E-15	0.13394E-14	0.44682E-14
7	0.68075E-16	0.10174E-15	0.16412E-15	0.28398E-15	0.55288E-15	0.13461E-14	0.44845E-14
8	0.68904E-16	0.10283E-15	0.16561E-15	0.28613E-15	0.55618E-15	0.13461E-14	0.44845E-14
9	0.69629E-16	0.10378E-15	0.16692E-15	0.28801E-15	0.55909E-15	0.13461E-14	0.44845E-14
10	0.70270E-16	0.10463E-15	0.16809E-15	0.28969E-15	0.56169E-15	0.13461E-14	0.44845E-14
11	0.70845E-16	0.10538E-15	0.16913E-15	0.29120E-15	0.56169E-15	0.13461E-14	0.44845E-14
12	0.71366E-16	0.10607E-15	0.17008E-15	0.29257E-15	0.56169E-15	0.13461E-14	0.44845E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0006	0.0005	66.9499	4.505	33.0501	66.9499	4.505	33.0501
3.500E-07	1.414	0.400	1.2175	0.9858	67.6574	4.593	32.3426	66.9451	4.504	33.0549
4.500E-07	1.320	0.600	1.7521	1.4252	68.9704	4.761	31.0296	68.1419	4.654	31.8581
5.500E-07	1.261	1.667	4.6048	3.7032	70.6479	4.988	29.3521	70.2062	4.927	29.7938
7.000E-07	1.205	5.000	12.7785	10.2894	72.8433	5.304	27.1567	72.4000	5.238	27.6000
9.000E-07	1.159	4.933	11.2896	9.1798	75.6818	5.753	24.3182	75.0419	5.647	24.9581
1.100E-06	1.130	4.733	9.7803	8.0446	78.0425	6.169	21.9575	77.2040	6.016	22.7960
1.300E-06	1.110	4.000	7.4838	6.2745	80.1194	6.573	19.8806	78.9619	6.343	21.0381
1.600E-06	1.090	8.000	13.1451	11.2107	82.5402	7.101	17.4598	81.2055	6.801	18.7945
2.000E-06	1.072	6.667	9.3219	8.2653	85.1427	7.758	14.8573	83.3728	7.300	16.6272
2.600E-06	1.055	10.667	11.9633	11.3053	88.0827	8.655	11.9173	85.7857	7.938	14.2143
3.500E-06	1.041	10.667	9.1117	9.3880	90.9234	9.763	9.0766	88.1963	8.694	11.8037
5.000E-06	1.029	11.333	5.9451	8.2623	94.4259	11.747	5.5741	90.2221	9.460	9.7779
8.000E-06	1.018	12.000	1.5119	5.5909	98.6613	17.551	1.3387	93.7514	11.282	6.2486
1.500E-05	1.010	19.333	0.0939	6.0744	99.9484	30.798	0.0516	95.7860	12.885	4.2140

EFFICIENCY = STATED = 82.45 COMPUTED = 82.4509 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 89.3741
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.581E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.730E+00
LOG-NORMAL GOODNESS OF FIT = 0.963
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.122

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 86.5882
CORRECTED MMD OF EFFLUENT = 2.138E+00
CORRECTED SIGMAP OF EFFLUENT = 2.008E+00
LOG-NORMAL GOODNESS OF FIT = 0.938
CORRECTED PRECIPITATION RATE PARAMETER = 8.17

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
1.938E+00	3.789E+01	1.409E-04	2.590E-03	2.730E-03	4.360E-02	2.500E-07
2.117E+00	4.056E+01	3.886E-01	8.557E-03	3.971E-01	1.022E-01	3.500E-07
2.323E+00	4.350E+01	7.209E-01	1.925E-02	7.402E-01	1.784E-01	4.500E-07
2.538E+00	4.641E+01	2.319E+00	3.489E-02	2.354E+00	2.642E-01	5.500E-07
2.867E+00	5.057E+01	4.078E+00	6.658E-02	4.145E+00	7.953E-01	7.000E-07
3.306E+00	5.563E+01	4.645E+00	1.222E-01	4.767E+00	1.132E+00	9.000E-07
3.743E+00	6.015E+01	4.925E+00	1.881E-01	5.113E+00	1.424E+00	1.100E-06
4.176E+00	6.417E+01	4.457E+00	2.595E-01	4.717E+00	1.661E+00	1.300E-06
4.818E+00	6.940E+01	4.802E+00	3.671E-01	5.169E+00	3.831E+00	1.600E-06
5.663E+00	7.514E+01	4.265E+00	5.081E-01	4.773E+00	4.234E+00	2.000E-06
6.913E+00	8.171E+01	3.541E+00	6.826E-01	4.224E+00	8.791E+00	2.600E-06
8.756E+00	8.837E+01	2.908E+00	8.737E-01	3.782E+00	1.044E+01	3.500E-06
1.175E+01	9.443E+01	1.346E+00	1.015E+00	2.361E+00	1.709E+01	5.000E-06
1.755E+01	9.866E+01	2.717E-01	9.966E-01	1.268E+00	2.114E+01	8.000E-06
3.080E+01	9.995E+01	1.244E-02	1.003E+00	1.016E+00	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 86.5882 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.821E+04 V

AVG. CURRENT DENSITY = 5.00 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.138E+00 UM OUTLET SIGMAP = 2.008E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*        E.P.A. ESP MODEL            *
*                                    *
*   I.E.R.L.-R.T.P. AND SO.R.I.      *
*                                    *
*     REVISION I,JAN. 1, 1978        *
*                                    *
**************************************
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 16 NDATA = 4

DATA ON CARD NUMBER 2

LAB ESP: SCA=125 FT2/1000ACFM; J=10 NA/CM2

DATA ON CARD NUMBER 3

VOS(1) = 4.1600E+04 V TCS(1) = 5.8140E-05 A
VOS(2) = 4.1200E+04 V TCS(2) = 5.8140E-05 A
VOS(3) = 3.9800E+04 V TCS(3) = 1.1628E-04 A

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=10 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.160E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 13.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0850	3.276E+05	2.2032E+05	9.7834E+12	10.0	6.86E-06	6.903E-06	2.022E-04	2.76E-08	1.00E-04	1
1.0662	3.276E+05	2.1988E+05	9.9551E+12	10.0	4.97E-06	5.947E-06	1.742E-04	3.91E-08	1.00E-04	2
1.0506	3.276E+05	2.1951E+05	1.0103E+13	10.0	3.88E-06	4.315E-06	1.264E-04	3.78E-08	1.00E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.120E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 13.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0383	3.244E+05	2.1733E+05	1.0322E+13	10.0	3.06E-06	3.082E-06	9.029E-05	3.42E-08	1.00E-04	4
1.0294	3.244E+05	2.1733E+05	1.0411E+13	10.0	2.55E-06	2.328E-06	6.819E-05	3.09E-08	1.00E-04	5
1.0226	3.244E+05	2.1733E+05	1.0480E+13	10.0	2.27E-06	1.823E-06	5.341E-05	2.80E-08	1.00E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.980E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 13.50

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0169	3.134E+05	2.1022E+05	1.0911E+13	10.0	2.06E-06	1.419E-06	4.156E-05	2.43E-08	1.00E-04	7
1.0131	3.134E+05	2.1022E+05	1.0952E+13	10.0	1.88E-06	1.168E-06	3.421E-05	2.20E-08	1.00E-04	8
1.0101	3.134E+05	2.1022E+05	1.0983E+13	10.0	1.73E-06	9.751E-07	2.857E-05	1.99E-08	1.00E-04	9

1.0079	3.134E+05	2.1022E+05	1.1008E+13	10.0	1.59E-06	8.224E-07	2.409E-05	1.80E-08	1.00E-04	10
1.0061	3.134E+05	2.1022E+05	1.1027E+13	10.0	1.52E-06	6.994E-07	2.049E-05	1.63E-08	1.00E-04	11
1.0048	3.134E+05	2.1022E+05	1.1042E+13	10.0	1.46E-06	5.985E-07	1.753E-05	1.47E-08	1.00E-04	12

EST. EFFICIENCY = 82.45 UNCORRECTED COMPUTED EFFICIENCY = 87.57

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=10 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.79AE-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.160E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.1004	3.276E+05	2.2069E+05	9.6463E+12	10.0	6.87E-06	6.881E-06	2.016E-04	2.74E-08	1.00E-04	1
1.0761	3.276E+05	2.2011E+05	9.8642E+12	10.0	4.97E-06	5.945E-06	1.742E-04	3.90E-08	1.00E-04	2
1.0565	3.276E+05	2.1964E+05	1.0047E+13	10.0	3.89E-06	4.321E-06	1.266E-04	3.78E-08	1.00E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.79AE-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.120E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.814E-05 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0416	3.244E+05	2.1741E+05	1.0290E+13	10.0	3.06E-06	3.087E-06	9.043E-05	3.41E-08	1.00E-04	4
1.0310	3.244E+05	2.1716E+05	1.0395E+13	10.0	2.55E-06	2.329E-06	6.822E-05	3.09E-08	1.00E-04	5
1.0232	3.244E+05	2.1716E+05	1.0475E+13	10.0	2.28E-06	1.824E-06	5.344E-05	2.79E-08	1.00E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 3.050E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.79AE-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 3.980E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 1.000E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 1.000E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0168	3.134E+05	2.1022E+05	1.0912E+13	10.0	2.06E-06	1.421E-06	4.162E-05	2.43E-08	1.00E-04	7
1.0126	3.134E+05	2.1022E+05	1.0956E+13	10.0	1.88E-06	1.169E-06	3.426E-05	2.20E-08	1.00E-04	8
1.0095	3.134E+05	2.1022E+05	1.0990E+13	10.0	1.73E-06	9.764E-07	2.860E-05	1.99E-08	1.00E-04	9
1.0072	3.134E+05	2.1022E+05	1.1015E+13	10.0	1.60E-06	8.234E-07	2.412E-05	1.80E-08	1.00E-04	10
1.0054	3.134E+05	2.1022E+05	1.1035E+13	10.0	1.52E-06	7.003E-07	2.052E-05	1.63E-08	1.00E-04	11
1.0041	3.134E+05	2.1022E+05	1.1049E+13	10.0	1.46E-06	5.992E-07	1.755E-05	1.47E-08	1.00E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0452	1.0452	1.0452	1.0452	1.0452	1.0452	1.0452	1.0348
2	1.5166	1.5049	1.4785	1.4507	1.4132	1.3726	1.3408	1.3132
3	1.7256	1.6942	1.6487	1.6049	1.5486	1.4897	1.4445	1.4079
4	1.8578	1.8106	1.7515	1.6968	1.6280	1.5573	1.5037	1.4611
5	1.9549	1.8952	1.8258	1.7630	1.6851	1.6058	1.5462	1.4992
6	2.0312	1.9614	1.8838	1.8146	1.7295	1.6435	1.5791	1.5287
7	2.0910	2.0117	1.9268	1.8521	1.7608	1.6692	1.6008	1.5475
8	2.1420	2.0547	1.9636	1.8842	1.7877	1.6913	1.6196	1.5639
9	2.1864	2.0922	1.9957	1.9122	1.8113	1.7107	1.6362	1.5783
10	2.2257	2.1253	2.0241	1.9370	1.8322	1.7280	1.6509	1.5913
11	2.2609	2.1550	2.0496	1.9593	1.8510	1.7436	1.6642	1.6029
12	2.2928	2.1819	2.0727	1.9795	1.8680	1.7577	1.6764	1.6136

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.9938	0.9542	0.9137	0.8752	0.8379	0.8004	0.7656
2	1.2749	1.2367	1.1959	1.1540	1.1072	1.0381	0.9558
3	1.3624	1.3179	1.2715	1.2260	1.1798	1.1299	1.0721
4	1.4100	1.3603	1.3087	1.2583	1.2079	1.1549	1.1004
5	1.4437	1.3900	1.3344	1.2803	1.2264	1.1703	1.1144
6	1.4698	1.4128	1.3540	1.2969	1.2401	1.1813	1.1236
7	1.4857	1.4260	1.3644	1.3048	1.2458	1.1848	1.1253
8	1.4995	1.4375	1.3736	1.3119	1.2458	1.1848	1.1253
9	1.5117	1.4477	1.3818	1.3182	1.2458	1.1848	1.1253
10	1.5227	1.4568	1.3891	1.3182	1.2458	1.1848	1.1253
11	1.5326	1.4652	1.3959	1.3182	1.2458	1.1848	1.1253
12	1.5417	1.4728	1.3959	1.3182	1.2458	1.1848	1.1253

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.17088E-17	0.30217E-17	0.47355E-17	0.68517E-17	0.10782E-16	0.17435E-16	0.25705E-16	0.35235E-16
2	0.24795E-17	0.43507E-17	0.66986E-17	0.95099E-17	0.14578E-16	0.22897E-16	0.32974E-16	0.44715E-16
3	0.28211E-17	0.48978E-17	0.74696E-17	0.10521E-16	0.15974E-16	0.24849E-16	0.35525E-16	0.47938E-16
4	0.30373E-17	0.52344E-17	0.79354E-17	0.11123E-16	0.16794E-16	0.25977E-16	0.36981E-16	0.49750E-16
5	0.31959E-17	0.54789E-17	0.82720E-17	0.11557E-16	0.17383E-16	0.26787E-16	0.38025E-16	0.51047E-16
6	0.33208E-17	0.56702E-17	0.85346E-17	0.11895E-16	0.17841E-16	0.27416E-16	0.38835E-16	0.52052E-16
7	0.34185E-17	0.58158E-17	0.87296E-17	0.12141E-16	0.18164E-16	0.27844E-16	0.39369E-16	0.52694E-16
8	0.35019E-17	0.59400E-17	0.88963E-17	0.12351E-16	0.18441E-16	0.28213E-16	0.39831E-16	0.53251E-16
9	0.35744E-17	0.60483E-17	0.90417E-17	0.12535E-16	0.18684E-16	0.28537E-16	0.40237E-16	0.53743E-16
10	0.36387E-17	0.61441E-17	0.91704E-17	0.12698E-16	0.18900E-16	0.28825E-16	0.40600E-16	0.54183E-16
11	0.36963E-17	0.62299E-17	0.92859E-17	0.12844E-16	0.19093E-16	0.29085E-16	0.40928E-16	0.54580E-16
12	0.37484E-17	0.63076E-17	0.93904E-17	0.12976E-16	0.19269E-16	0.29321E-16	0.41226E-16	0.54942E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.50820E-16	0.75704E-16	0.12174E-15	0.21021E-15	0.40893E-15	0.99645E-15	0.33415E-14
2	0.65193E-16	0.98113E-16	0.15933E-15	0.27718E-15	0.54038E-15	0.12923E-14	0.41718E-14
3	0.69668E-16	0.10456E-15	0.16941E-15	0.29447E-15	0.57580E-15	0.14066E-14	0.46793E-14
4	0.72101E-16	0.10792E-15	0.17436E-15	0.30224E-15	0.58952E-15	0.14377E-14	0.48028E-14
5	0.73828E-16	0.11028E-15	0.17778E-15	0.30752E-15	0.59857E-15	0.14569E-14	0.48640E-14
6	0.75160E-16	0.11208E-15	0.18039E-15	0.31150E-15	0.60527E-15	0.14706E-14	0.49040E-14
7	0.75972E-16	0.11313E-15	0.18178E-15	0.31340E-15	0.60802E-15	0.14749E-14	0.49115E-14
8	0.76680E-16	0.11404E-15	0.18300E-15	0.31510E-15	0.60802E-15	0.14749E-14	0.49115E-14
9	0.77306E-16	0.11485E-15	0.18409E-15	0.31661E-15	0.60802E-15	0.14749E-14	0.49115E-14
10	0.77867E-16	0.11558E-15	0.18508E-15	0.31661E-15	0.60802E-15	0.14749E-14	0.49115E-14
11	0.78375E-16	0.11624E-15	0.18597E-15	0.31661E-15	0.60802E-15	0.14749E-14	0.49115E-14
12	0.78838E-16	0.11684E-15	0.18597E-15	0.31661E-15	0.60802E-15	0.14749E-14	0.49115E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0007	0.0005	76.6852	5.925	23.3148	76.6852	5.925	23.3148
3.500E-07	1.414	0.400	1.4497	1.0763	77.1172	6.001	22.8828	76.4982	5.892	23.5018
4.500E-07	1.320	0.600	2.0693	1.5452	78.2258	6.203	21.7742	77.5058	6.070	22.4942
5.500E-07	1.261	1.667	5.3602	3.9478	79.6989	6.488	20.3011	79.3151	6.411	20.6849
7.000E-07	1.205	5.000	14.5543	10.7409	81.6219	6.893	18.3781	81.2367	6.808	18.7633
9.000E-07	1.159	4.933	12.4445	9.3094	84.0726	7.475	15.9274	83.5166	7.335	16.4834
1.100E-06	1.130	4.733	10.4480	7.9470	86.0628	8.018	13.9372	85.3342	7.811	14.6658
1.300E-06	1.110	4.000	7.7641	6.0728	87.7451	8.541	12.2549	86.7393	8.220	13.2607
1.600E-06	1.090	8.000	13.1932	10.5988	89.5879	9.204	10.4121	88.4281	8.775	11.5719
2.000E-06	1.072	6.667	8.9692	7.6572	91.5062	10.033	8.4938	89.9683	9.356	10.0317
2.600E-06	1.055	10.667	10.8658	10.2919	93.5687	11.165	6.4313	91.5726	10.065	8.4274
3.500E-06	1.041	10.667	7.7250	8.4781	95.4277	12.553	4.5723	93.0579	10.854	6.9421
5.000E-06	1.029	11.333	4.4101	7.9275	97.5431	15.080	2.4569	93.8902	11.373	6.1098
8.000E-06	1.018	12.000	0.7286	6.3884	99.6166	22.639	0.3834	95.3501	12.484	4.6499
1.500E-05	1.010	19.333	0.0172	8.0183	99.9944	39.818	0.0056	96.3774	13.500	3.6226

EFFICIENCY = STATED = 87.57 COMPUTED = 87.5543 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 93.6864
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.436E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.671E+00
LOG-NORMAL GOODNESS OF FIT = 0.957
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.240

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 91.2655
CORRECTED MMD OF EFFLUENT = 2.192E+00
CORRECTED SIGMAP OF EFFLUENT = 2.064E+00
LOG-NORMAL GOODNESS OF FIT = 0.928
CORRECTED PRECIPITATION RATE PARAMETER = 9.92

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
2.548E+00	4.654E+01	9.937E-05	2.250E-03	2.350E-03	4.360E-02	2.500E-07
2.765E+00	4.932E+01	2.749E-01	7.436E-03	2.824E-01	1.022E-01	3.500E-07
3.026E+00	5.246E+01	5.059E-01	1.673E-02	5.226E-01	1.784E-01	4.500E-07
3.302E+00	5.558E+01	1.604E+00	3.032E-02	1.634E+00	2.642E-01	5.500E-07
3.726E+00	5.998E+01	2.760E+00	5.785E-02	2.818E+00	7.953E-01	7.000E-07
4.296E+00	6.521E+01	3.042E+00	1.062E-01	3.149E+00	1.132E+00	9.000E-07
4.865E+00	6.975E+01	3.126E+00	1.634E-01	3.290E+00	1.424E+00	1.100E-06
5.427E+00	7.365E+01	2.748E+00	2.255E-01	2.973E+00	1.661E+00	1.300E-06
6.245E+00	7.845E+01	2.864E+00	3.190E-01	3.183E+00	3.831E+00	1.600E-06
7.323E+00	8.347E+01	2.438E+00	4.415E-01	2.880E+00	4.234E+00	2.000E-06
8.918E+00	8.883E+01	1.911E+00	5.932E-01	2.504E+00	8.791E+00	2.600E-06
1.126E+01	9.371E+01	1.465E+00	7.592E-01	2.224E+00	1.044E+01	3.500E-06
1.508E+01	9.754E+01	5.934E-01	8.822E-01	1.476E+00	1.709E+01	5.000E-06
2.264E+01	9.962E+01	7.781E-02	8.660E-01	9.438E-01	2.114E+01	8.000E-06
3.982E+01	9.999E+01	1.355E-03	8.717E-01	8.730E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 91.2655 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.060E+04 V

AVG. CURRENT DENSITY = 10.00 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.192E+00 UM OUTLET SIGMAP = 2.064E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.T.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 16 NDATA = 4

DATA ON CARD NUMBER 2

LAB ESP; SCA=125 FT2/1000ACFM; J=20 NA/CM2

DATA ON CARD NUMBER 3

VOS(1) = 4.4700E+04 V TCS(1) = 1.1628E-04 A

VOS(2) = 4.4400E+04 V TCS(2) = 1.1628E-04 A

VOS(3) = 4.3000E+04 V TCS(3) = 2.3256E-04 A

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=20 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.470E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0539	3.520E+05	2.5701E+05	1.8746E+13	20.0	6.70E-06	9.430E-06	2.763E-04	4.38E-08	2.00E-04	1
1.0394	3.520E+05	2.5643E+05	1.9009E+13	20.0	4.37E-06	6.437E-06	1.886E-04	5.41E-08	2.00E-04	2
1.0283	3.520E+05	2.5600E+05	1.9214E+13	20.0	3.11E-06	4.158E-06	1.218E-04	4.88E-08	2.00E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0203	3.496E+05	2.5423E+05	1.9496E+13	20.0	2.49E-06	2.885E-06	8.451E-05	4.27E-08	2.00E-04	4
1.0147	3.496E+05	2.5423E+05	1.9603E+13	20.0	2.16E-06	2.140E-06	6.270E-05	3.76E-08	2.00E-04	5
1.0107	3.496E+05	2.5423E+05	1.9680E+13	20.0	1.92E-06	1.649E-06	4.830E-05	3.30E-08	2.00E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.300E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.326E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 15.95

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0075	3.386E+05	2.4692E+05	2.0384E+13	20.0	1.72E-06	1.265E-06	3.704E-05	2.80E-08	2.00E-04	7
1.0055	3.386E+05	2.4692E+05	2.0425E+13	20.0	1.57E-06	1.019E-06	2.985E-05	2.46E-08	2.00E-04	8
1.0041	3.386E+05	2.4692E+05	2.0455E+13	20.0	1.49E-06	8.318E-07	2.437E-05	2.17E-08	2.00E-04	9

1.0030	3.386E+05	2.4692E+05	2.0477E+13	20.0	1.41E-06	6.854E-07	2.008E-05	1.91E-08	2.00E-04	10
1.0022	3.386E+05	2.4692E+05	2.0493E+13	20.0	1.35E-06	5.692E-07	1.668E-05	1.68E-08	2.00E-04	11
1.0016	3.386E+05	2.4692E+05	2.0505E+13	20.0	1.28E-06	4.757E-07	1.394E-05	1.49E-08	2.00E-04	12

EST. EFFICIENCY = 87.57 UNCORRECTED COMPUTED EFFICIENCY = 91.83

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=20 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.470E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0637	3.520E+05	2.5739E+05	1.8574E+13	20.0	6.70E-06	9.430E-06	2.763E-04	4.38E-08	2.00E-04	1
1.0449	3.520E+05	2.5666E+05	1.8908E+13	20.0	4.38E-06	6.441E-06	1.887E-04	5.41E-08	2.00E-04	2
1.0311	3.520E+05	2.5611E+05	1.9160E+13	20.0	3.11E-06	4.158E-06	1.218E-04	4.88E-08	2.00E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.440E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 1.163E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0215	3.496E+05	2.5427E+05	1.9471E+13	20.0	2.49E-06	2.884E-06	8.489E-05	4.27E-08	2.00E-04	4
1.0151	3.496E+05	2.5427E+05	1.9595E+13	20.0	2.16E-06	2.140E-06	6.268E-05	3.75E-08	2.00E-04	5
1.0106	3.496E+05	2.5427E+05	1.9682E+13	20.0	1.92E-06	1.648E-06	4.829E-05	3.30E-08	2.00E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 6.100E-05 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.300E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 2.001E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.326E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 2.001E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0072	3.386E+05	2.4691E+05	2.0391E+13	20.0	1.72E-06	1.264E-06	3.703E-05	2.80E-08	2.00E-04	7
1.0051	3.386E+05	2.4691E+05	2.0434E+13	20.0	1.57E-06	1.019E-06	2.984E-05	2.46E-08	2.00E-04	8
1.0036	3.386E+05	2.4691E+05	2.0464E+13	20.0	1.48E-06	8.315E-07	2.436E-05	2.17E-08	2.00E-04	9
1.0026	3.386E+05	2.4691E+05	2.0485E+13	20.0	1.41E-06	6.851E-07	2.007E-05	1.91E-08	2.00E-04	10
1.0018	3.386E+05	2.4691E+05	2.0501E+13	20.0	1.35E-06	5.691E-07	1.667E-05	1.68E-08	2.00E-04	11
1.0013	3.386E+05	2.4691E+05	2.0511E+13	20.0	1.28E-06	4.756E-07	1.393E-05	1.49E-08	2.00E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395
2	1.6383	1.6153	1.5773	1.5397	1.4905	1.4386	1.3985	1.3669
3	1.8507	1.8036	1.7445	1.6900	1.6213	1.5510	1.4977	1.4560
4	1.9790	1.9150	1.8421	1.7768	1.6961	1.6144	1.5531	1.5055
5	2.0713	1.9945	1.9116	1.8384	1.7491	1.6593	1.5923	1.5404
6	2.1431	2.0561	1.9653	1.8860	1.7899	1.6939	1.6226	1.5674
7	2.1985	2.1024	2.0046	1.9202	1.8184	1.7172	1.6422	1.5844
8	2.2456	2.1418	2.0382	1.9494	1.8428	1.7372	1.6592	1.5991
9	2.2866	2.1761	2.0675	1.9749	1.8642	1.7548	1.6742	1.6121
10	2.3228	2.2065	2.0934	1.9976	1.8832	1.7705	1.6875	1.6238
11	2.3552	2.2336	2.1167	2.0178	1.9002	1.7846	1.6995	1.6343
12	2.3845	2.2582	2.1377	2.0362	1.9157	1.7974	1.7105	1.6439

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0395	1.0395	1.0395	1.0395	1.0395	0.9930	0.9272
2	1.3301	1.2940	1.2561	1.2189	1.1815	1.1366	1.0860
3	1.4081	1.3615	1.3130	1.2657	1.2185	1.1668	1.1145
4	1.4509	1.3980	1.3433	1.2902	1.2374	1.1810	1.1251
5	1.4812	1.4239	1.3648	1.3076	1.2509	1.1910	1.1323
6	1.5045	1.4439	1.3815	1.3211	1.2614	1.1988	1.1379
7	1.5186	1.4553	1.3903	1.3275	1.2656	1.2012	1.1379
8	1.5309	1.4653	1.3981	1.3275	1.2656	1.2012	1.1379
9	1.5418	1.4743	1.4050	1.3275	1.2656	1.2012	1.1379
10	1.5515	1.4823	1.4050	1.3275	1.2656	1.2012	1.1379
11	1.5604	1.4896	1.4050	1.3275	1.2656	1.2012	1.1379
12	1.5685	1.4896	1.4050	1.3275	1.2656	1.2012	1.1379

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.18361E-17	0.32469E-17	0.50883E-17	0.73622E-17	0.11585E-16	0.18735E-16	0.27620E-16	0.38242E-16
2	0.28937E-17	0.50453E-17	0.77208E-17	0.10904E-16	0.16611E-16	0.25926E-16	0.37159E-16	0.50285E-16
3	0.32688E-17	0.56333E-17	0.85393E-17	0.11969E-16	0.18070E-16	0.27952E-16	0.39793E-16	0.53564E-16
4	0.34956E-17	0.59812E-17	0.90169E-17	0.12584E-16	0.18903E-16	0.29095E-16	0.41265E-16	0.55383E-16
5	0.36585E-17	0.62295E-17	0.93567E-17	0.13020E-16	0.19493E-16	0.29904E-16	0.42307E-16	0.56670E-16
6	0.37854E-17	0.64221E-17	0.96196E-17	0.13357E-16	0.19949E-16	0.30528E-16	0.43111E-16	0.57662E-16
7	0.38832E-17	0.65666E-17	0.98123E-17	0.13599E-16	0.20266E-16	0.30947E-16	0.43633E-16	0.58286E-16
8	0.39665E-17	0.66898E-17	0.99768E-17	0.13806E-16	0.20538E-16	0.31309E-16	0.44084E-16	0.58828E-16
9	0.40388E-17	0.67969E-17	0.10120E-16	0.13987E-16	0.20776E-16	0.31626E-16	0.44482E-16	0.59307E-16
10	0.41028E-17	0.68916E-17	0.10247E-16	0.14147E-16	0.20988E-16	0.31908E-16	0.44836E-16	0.59735E-16
11	0.41600E-17	0.69764E-17	0.10361E-16	0.14291E-16	0.21178E-16	0.32162E-16	0.45156E-16	0.60123E-16
12	0.42118E-17	0.70532E-17	0.10464E-16	0.14421E-16	0.21351E-16	0.32393E-16	0.45448E-16	0.60476E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.57433E-16	0.89101E-16	0.14963E-15	0.26976E-15	0.54815E-15	0.13356E-14	0.43720E-14
2	0.73487E-16	0.11091E-15	0.18081E-15	0.31631E-15	0.62299E-15	0.15287E-14	0.51210E-14
3	0.77795E-16	0.11669E-15	0.18899E-15	0.32845E-15	0.64252E-15	0.15694E-14	0.52554E-14
4	0.80159E-16	0.11983E-15	0.19336E-15	0.33480E-15	0.65247E-15	0.15884E-14	0.53052E-14
5	0.81833E-16	0.12205E-15	0.19646E-15	0.33933E-15	0.65959E-15	0.16019E-14	0.53395E-14
6	0.83123E-16	0.12376E-15	0.19885E-15	0.34283E-15	0.66512E-15	0.16124E-14	0.53656E-14
7	0.83900E-16	0.12474E-15	0.20012E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14
8	0.84579E-16	0.12560E-15	0.20124E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14
9	0.85180E-16	0.12636E-15	0.20225E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14
10	0.85720E-16	0.12705E-15	0.20225E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14
11	0.86209E-16	0.12768E-15	0.20225E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14
12	0.86657E-16	0.12768E-15	0.20225E-15	0.34449E-15	0.66738E-15	0.16156E-14	0.53656E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.500E-07	1.590	0.000	0.0009	0.0006	85.5919	7.883	14.4081	85.5919	7.883	14.4081
3.500E-07	1.414	0.400	1.7481	1.1319	85.7881	7.939	14.2119	85.2906	7.799	14.7094
4.500E-07	1.320	0.600	2.4775	1.6167	86.5725	8.170	13.4275	85.9937	7.998	14.0063
5.500E-07	1.261	1.667	6.3225	4.0543	87.6664	8.515	12.3336	87.3578	8.415	12.6422
7.000E-07	1.205	5.000	16.7903	10.8020	89.0799	9.011	10.9201	88.7702	8.897	11.2298
9.000E-07	1.159	4.933	13.8686	9.1004	90.8576	9.734	9.1424	90.4107	9.539	9.5893
1.100E-06	1.130	4.733	11.2677	7.5824	92.2583	10.410	7.7417	91.6726	10.114	8.3274
1.300E-06	1.110	4.000	8.0865	5.6811	93.4259	11.075	6.5741	92.6173	10.603	7.3827
1.600E-06	1.090	8.000	13.0389	9.5922	94.6999	11.952	5.3001	93.7675	11.293	6.2325
2.000E-06	1.072	6.667	8.3091	6.7839	95.9472	13.044	4.0528	94.7108	11.960	5.2892
2.600E-06	1.055	10.667	9.2422	9.0748	97.1825	14.523	2.8175	95.5778	12.689	4.4222
3.500E-06	1.041	10.667	5.8984	7.5995	98.2018	16.350	1.7982	96.2968	13.411	3.7032
5.000E-06	1.029	11.333	2.6989	8.0909	99.2256	19.778	0.7744	96.2890	13.402	3.7110
8.000E-06	1.018	12.000	0.2490	8.0739	99.9325	29.706	0.0675	96.5027	13.643	3.4973
1.500E-05	1.010	19.333	0.0015	10.8153	99.9998	52.559	0.0002	97.0921	14.394	2.9079

EFFICIENCY = STATED = 91.83 COMPUTED = 91.8323 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 96.7481
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.322E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.638E+00
LOG-NORMAL GOODNESS OF FIT = 0.960
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 13.939

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 94.8020
CORRECTED MMD OF EFFLUENT = 2.322E+00
CORRECTED SIGMAP OF EFFLUENT = 2.141E+00
LOG-NORMAL GOODNESS OF FIT = 0.917
CORRECTED PRECIPITATION RATE PARAMETER = 12.03

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.390E+00	5.654E+01	6.141E-05	1.809E-03	1.870E-03	4.360E-02	2.500E-07
3.658E+00	5.931E+01	1.707E-01	5.977E-03	1.767E-01	1.022E-01	3.500E-07
3.985E+00	6.245E+01	3.120E-01	1.345E-02	3.254E-01	1.784E-01	4.500E-07
4.334E+00	6.553E+01	9.744E-01	2.437E-02	9.988E-01	2.642E-01	5.500E-07
4.871E+00	6.979E+01	1.640E+00	4.651E-02	1.686E+00	7.953E-01	7.000E-07
5.594E+00	7.471E+01	1.746E+00	8.538E-02	1.832E+00	1.132E+00	9.000E-07
6.317E+00	7.883E+01	1.737E+00	1.314E-01	1.868E+00	1.424E+00	1.100E-06
7.037E+00	8.226E+01	1.474E+00	1.813E-01	1.655E+00	1.661E+00	1.300E-06
8.108E+00	8.637E+01	1.458E+00	2.565E-01	1.714E+00	3.831E+00	1.600E-06
9.521E+00	9.037E+01	1.163E+00	3.549E-01	1.518E+00	4.234E+00	2.000E-06
1.160E+01	9.422E+01	8.373E-01	4.768E-01	1.314E+00	8.791E+00	2.600E-06
1.466E+01	9.728E+01	5.761E-01	6.103E-01	1.186E+00	1.044E+01	3.500E-06
1.978E+01	9.923E+01	1.870E-01	7.092E-01	8.962E-01	1.709E+01	5.000E-06
2.971E+01	9.993E+01	1.370E-02	6.962E-01	7.099E-01	2.114E+01	8.000E-06
5.256E+01	1.000E+02	5.930E-05	7.007E-01	7.008E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 94.8020 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.377E+04 V
AVG. CURRENT DENSITY = 20.01 NA/CM**2
RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00
OUTLET MMD = 2.322E+00 UM OUTLET SIGMAP = 2.141E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*        E.P.A. ESP MODEL            *
*                                    *
*    T.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*      REVISION I,JAN. 1, 1978       *
*                                    *
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PRINTOUT OF INPUT DATA FOR DATA SET NUMBER 1

DATA ON CARD NUMBER 1

NENDPT = 16 NDATA = 4

DATA ON CARD NUMBER 2

LAB ESP: SCA=125 FT2/1000ACFM; J=35 NA/CM2

DATA ON CARD NUMBER 3

VOS(1) = 4.7800E+04 V TCS(1) = 2.0349E-04 A

VOS(2) = 4.7800E+04 V TCS(2) = 2.0349E-04 A

VOS(3) = 4.6600E+04 V TCS(3) = 4.0698E-04 A

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=35 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.780E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.035E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0389	3.764E+05	2.9904E+05	3.1121E+13	35.0	6.67E-06	1.138E-05	3.334E-04	5.80E-08	3.50E-04	1
1.0265	3.764E+05	2.9832E+05	3.1497E+13	35.0	3.70E-06	6.687E-06	1.959E-04	6.98E-08	3.50E-04	2
1.0178	3.764E+05	2.9832E+05	3.1768E+13	35.0	2.64E-06	4.117E-06	1.206E-04	6.06E-08	3.50E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.780E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.035E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0120	3.764E+05	2.9743E+05	3.1951E+13	35.0	2.20E-06	2.793E-06	8.181E-05	5.15E-08	3.50E-04	4
1.0081	3.764E+05	2.9743E+05	3.2073E+13	35.0	1.89E-06	2.017E-06	5.910E-05	4.37E-08	3.50E-04	5
1.0055	3.764E+05	2.9743E+05	3.2156E+13	35.0	1.65E-06	1.510E-06	4.422E-05	3.71E-08	3.50E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.660E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 4.070E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 18.84

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0036	3.669E+05	2.9112E+05	3.3045E+13	35.0	1.51E-06	1.131E-06	3.314E-05	3.08E-08	3.50E-04	7
1.0025	3.669E+05	2.9112E+05	3.3082E+13	35.0	1.42E-06	8.832E-07	2.587E-05	2.62E-08	3.50E-04	8
1.0017	3.669E+05	2.9112E+05	3.3108E+13	35.0	1.33E-06	6.985E-07	2.046E-05	2.23E-08	3.50E-04	9

1.0012	3.669E+05	2.9112E+05	3.3126E+13	35.0	1.25E-06	5.578E-07	1.634E-05	1.91E-08	3.50E-04	10
1.0008	3.669E+05	2.9112E+05	3.3138E+13	35.0	1.17E-06	4.492E-07	1.316E-05	1.63E-08	3.50E-04	11
1.0006	3.669E+05	2.9112E+05	3.3146E+13	35.0	1.10E-06	3.641E-07	1.067E-05	1.40E-08	3.50E-04	12

EST. EFFICIENCY = 91.83 UNCORRECTED COMPUTED EFFICIENCY = 94.88

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=35 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.780E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.035E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0453	3.764E+05	2.9943E+05	3.0931E+13	35.0	6.67E-06	1.139E-05	3.337E-04	5.81E-08	3.50E-04	1
1.0297	3.764E+05	2.9850E+05	3.1400E+13	35.0	3.70E-06	6.684E-06	1.958E-04	6.98E-08	3.50E-04	2
1.0191	3.764E+05	2.9786E+05	3.1726E+13	35.0	2.64E-06	4.109E-06	1.204E-04	6.05E-08	3.50E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.780E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.035E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0124	3.764E+05	2.9745E+05	3.1937E+13	35.0	2.20E-06	2.793E-06	8.181E-05	5.15E-08	3.50E-04	4
1.0081	3.764E+05	2.9745E+05	3.2074E+13	35.0	1.89E-06	2.018E-06	5.911E-05	4.37E-08	3.50E-04	5
1.0053	3.764E+05	2.9745E+05	3.2163E+13	35.0	1.65E-06	1.510E-06	4.423E-05	3.71E-08	3.50E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.067E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.660E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 3.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 4.070E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 3.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.

1.0034	3.669E+05	2.9110E+05	3.3054E+13	35.0	1.51E-06	1.131E-06	3.314E-05	3.08E-08	3.50E-04	7
1.0022	3.669E+05	2.9110E+05	3.3092E+13	35.0	1.42E-06	A.833E-07	2.588E-05	2.62E-08	3.50E-04	8
1.0015	3.669E+05	2.9110E+05	3.3116E+13	35.0	1.33E-06	6.985E-07	2.046E-05	2.23E-08	3.50E-04	9
1.0010	3.669E+05	2.9110E+05	3.3133E+13	35.0	1.25E-06	5.578E-07	1.634E-05	1.91E-08	3.50E-04	10
1.0006	3.669E+05	2.9110E+05	3.3144E+13	35.0	1.17E-06	4.492E-07	1.316E-05	1.63E-08	3.50E-04	11
1.0004	3.669E+05	2.9110E+05	3.3151E+13	35.0	1.10E-06	3.642E-07	1.067E-05	1.40E-08	3.50E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0258	1.0258	1.0258	1.0258	1.0258	1.0258	1.0258	1.0258
2	1.7051	1.6729	1.6266	1.5822	1.5254	1.4664	1.4213	1.3859
3	1.9097	1.8520	1.7845	1.7236	1.6480	1.5713	1.5136	1.4687
4	2.0316	1.9573	1.8768	1.8057	1.7188	1.6316	1.5665	1.5160
5	2.1182	2.0317	1.9417	1.8633	1.7684	1.6737	1.6034	1.5491
6	2.1852	2.0891	1.9916	1.9076	1.8065	1.7060	1.6316	1.5743
7	2.2369	2.1323	2.0285	1.9397	1.8334	1.7281	1.6504	1.5906
8	2.2808	2.1691	2.0599	1.9671	1.8563	1.7471	1.6666	1.6047
9	2.3189	2.2010	2.0872	1.9909	1.8764	1.7637	1.6808	1.6171
10	2.3525	2.2292	2.1113	2.0120	1.8941	1.7784	1.6934	1.6282
11	2.3826	2.2544	2.1329	2.0309	1.9101	1.7916	1.7047	1.6381
12	2.4098	2.2772	2.1525	2.0480	1.9245	1.8036	1.7150	1.6472

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0258	1.0258	1.0258	1.0258	1.0258	1.0258	1.0258
2	1.3449	1.3048	1.2630	1.2221	1.1810	1.1383	1.0966
3	1.4172	1.3673	1.3155	1.2652	1.2152	1.1634	1.1132
4	1.4584	1.4028	1.3453	1.2897	1.2345	1.1776	1.1227
5	1.4871	1.4275	1.3660	1.3067	1.2479	1.1874	1.1292
6	1.5091	1.4464	1.3818	1.3196	1.2580	1.1948	1.1342
7	1.5227	1.4576	1.3906	1.3261	1.2626	1.1975	1.1342
8	1.5346	1.4673	1.3983	1.3261	1.2626	1.1975	1.1342
9	1.5450	1.4760	1.4052	1.3261	1.2626	1.1975	1.1342
10	1.5544	1.4837	1.4052	1.3261	1.2626	1.1975	1.1342
11	1.5628	1.4907	1.4052	1.3261	1.2626	1.1975	1.1342
12	1.5705	1.4907	1.4052	1.3261	1.2626	1.1975	1.1342

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.19635E-17	0.34720E-17	0.54412E-17	0.78728E-17	0.12389E-16	0.20034E-16	0.29536E-16	0.40895E-16
2	0.32639E-17	0.56625E-17	0.86283E-17	0.12144E-16	0.18424E-16	0.28640E-16	0.40925E-16	0.55252E-16
3	0.36555E-17	0.62687E-17	0.94663E-17	0.13229E-16	0.19904E-16	0.30688E-16	0.43582E-16	0.58553E-16
4	0.38888E-17	0.66253E-17	0.99555E-17	0.13859E-16	0.20760E-16	0.31866E-16	0.45105E-16	0.60441E-16
5	0.40546E-17	0.68771E-17	0.10300E-16	0.14301E-16	0.21359E-16	0.32690E-16	0.46168E-16	0.61758E-16
6	0.41829E-17	0.70712E-17	0.10565E-16	0.14641E-16	0.21818E-16	0.33320E-16	0.46982E-16	0.62764E-16
7	0.42820E-17	0.72177E-17	0.10760E-16	0.14888E-16	0.22143E-16	0.33752E-16	0.47523E-16	0.63416E-16
8	0.43660E-17	0.73421E-17	0.10927E-16	0.15098E-16	0.22421E-16	0.34123E-16	0.47988E-16	0.63978E-16
9	0.44389E-17	0.74501E-17	0.11072E-16	0.15281E-16	0.22663E-16	0.34446E-16	0.48396E-16	0.64472E-16
10	0.45032E-17	0.75454E-17	0.11200E-16	0.15443E-16	0.22877E-16	0.34734E-16	0.48759E-16	0.64912E-16
11	0.45608E-17	0.76308E-17	0.11314E-16	0.15588E-16	0.23070E-16	0.34992E-16	0.49086E-16	0.65309E-16
12	0.46128E-17	0.77080E-17	0.11418E-16	0.15719E-16	0.23244E-16	0.35227E-16	0.49383E-16	0.65670E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.61416E-16	0.95280E-16	0.16001E-15	0.28846E-15	0.58617E-15	0.14951E-14	0.52419E-14
2	0.80524E-16	0.12120E-15	0.19702E-15	0.34367E-15	0.67490E-15	0.16591E-14	0.56039E-14
3	0.84852E-16	0.12700E-15	0.20521E-15	0.35581E-15	0.69441E-15	0.16957E-14	0.56890E-14
4	0.87322E-16	0.13030E-15	0.20987E-15	0.36269E-15	0.70545E-15	0.17164E-14	0.57373E-14
5	0.89042E-16	0.13260E-15	0.21309E-15	0.36746E-15	0.71309E-15	0.17307E-14	0.57707E-14
6	0.90355E-16	0.13435E-15	0.21556E-15	0.37109E-15	0.71891E-15	0.17416E-14	0.57961E-14
7	0.91173E-16	0.13539E-15	0.21693E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14
8	0.91882E-16	0.13630E-15	0.21813E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14
9	0.92508E-16	0.13710E-15	0.21920E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14
10	0.93067E-16	0.13782E-15	0.21920E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14
11	0.93571E-16	0.13847E-15	0.21920E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14
12	0.94031E-16	0.13847E-15	0.21920E-15	0.37294E-15	0.72150E-15	0.17454E-14	0.57961E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0011	0.0005	91.8626	10.207	8.1374	91.8626	10.207	8.1374
3.500E-07	1.414	0.400	2.1161	1.1281	91.9404	10.247	8.0596	91.5652	10.061	8.4348
4.500E-07	1.320	0.600	2.9684	1.5996	92.4629	10.519	7.5371	92.0265	10.290	7.9735
5.500E-07	1.261	1.667	7.4294	3.9141	93.2102	10.944	6.7898	92.9776	10.807	7.0224
7.000E-07	1.205	5.000	19.1709	10.1557	94.1587	11.556	5.8413	93.9252	11.397	6.0748
9.000E-07	1.159	4.933	15.1540	8.2750	95.3199	12.458	4.6801	94.9829	12.175	5.0171
1.100E-06	1.130	4.733	11.8102	6.7148	96.1985	13.304	3.8015	95.7568	12.857	4.2432
1.300E-06	1.110	4.000	8.1326	4.9580	96.9025	14.137	3.0975	96.2929	13.406	3.7071
1.600E-06	1.090	8.000	12.4186	8.2063	97.6351	15.235	2.3649	96.9320	14.176	3.0680
2.000E-06	1.072	6.667	7.3917	5.8433	98.3109	16.605	1.6891	97.3787	14.817	2.6213
2.600E-06	1.055	10.667	7.4929	8.1319	98.9298	18.462	1.0702	97.7200	15.384	2.2800
3.500E-06	1.041	10.667	4.2673	7.2967	99.3905	20.752	0.6095	97.9541	15.825	2.0459
5.000E-06	1.029	11.333	1.5722	9.1909	99.7887	25.062	0.2113	97.5745	15.132	2.4255
8.000E-06	1.018	12.000	0.0736	10.4136	99.9907	37.753	0.0093	97.4045	14.857	2.5955
1.500E-05	1.010	19.333	0.0013	14.1716	99.9999	66.939	0.0001	97.8076	15.544	2.1924

EFFICIENCY = STATED = 94.88 COMPUTED = 94.8744 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.4765
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.225E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.610E+00
LOG-NORMAL GOODNESS OF FIT = 0.962
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 17.025

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 97.0092
CORRECTED MMD OF EFFLUENT = 2.559E+00
CORRECTED SIGMAP OF EFFLUENT = 2.230E+00
LOG-NORMAL GOODNESS OF FIT = 0.908
CORRECTED PRECIPITATION RATE PARAMETER = 14.28

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.390E+00	6.601E+01	3.468E-05	1.364E-03	1.399E-03	4.360E-02	2.500E-07
4.722E+00	6.867E+01	9.683E-02	4.507E-03	1.013E-01	1.022E-01	3.500E-07
5.131E+00	7.167E+01	1.751E-01	1.014E-02	1.853E-01	1.784E-01	4.500E-07
5.570E+00	7.456E+01	5.364E-01	1.838E-02	5.548E-01	2.642E-01	5.500E-07
6.247E+00	7.846E+01	8.772E-01	3.507E-02	9.123E-01	7.953E-01	7.000E-07
7.160E+00	8.279E+01	8.940E-01	6.438E-02	9.584E-01	1.132E+00	9.000E-07
8.073E+00	8.625E+01	8.527E-01	9.906E-02	9.518E-01	1.424E+00	1.100E-06
8.982E+00	8.900E+01	6.945E-01	1.367E-01	8.312E-01	1.661E+00	1.300E-06
1.034E+01	9.212E+01	6.505E-01	1.934E-01	8.439E-01	3.831E+00	1.600E-06
1.212E+01	9.491E+01	4.849E-01	2.676E-01	7.525E-01	4.234E+00	2.000E-06
1.475E+01	9.733E+01	3.180E-01	3.595E-01	6.776E-01	8.791E+00	2.600E-06
1.861E+01	9.897E+01	1.953E-01	4.602E-01	6.555E-01	1.044E+01	3.500E-06
2.506E+01	9.979E+01	5.104E-02	5.347E-01	5.858E-01	1.709E+01	5.000E-06
3.775E+01	9.999E+01	1.896E-03	5.249E-01	5.268E-01	2.114E+01	8.000E-06
6.694E+01	1.000E+02	2.390E-05	5.284E-01	5.284E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 97.0092 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.720E+04 V

AVG. CURRENT DENSITY = 35.01 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.559E+00 UM OUTLET SIGMAP = 2.230E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

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**************************************
*                                    *
*         E.P.A. ESP MODEL           *
*                                    *
*    I.E.R.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION 1,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 16   NDATA =  4

DATA ON CARD NUMBER   2

LAB ESP: SCA=125 FT2/1000ACFM; J=45 NA/CM2

DATA ON CARD NUMBER   3

VOS( 1) =  4.9400E+04 V  TCS( 1) =  2.6163E-04 A
VOS( 2) =  4.9400E+04 V  TCS( 2) =  2.6163E-04 A
VOS( 3) =  4.7600E+04 V  TCS( 3) =  5.2326E-04 A
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INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP: SCA=125 FT2/1000ACFM; J=45 NA/CM2

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.372E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.940E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 4.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.616E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 4.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0364	3.890E+05	3.2265E+05	3.8810E+13	45.0	6.53E-06	1.224E-05	3.586E-04	6.56E-08	4.50E-04	1
1.0234	3.890E+05	3.2179E+05	3.9302E+13	45.0	3.45E-06	6.853E-06	2.008E-04	7.86E-08	4.50E-04	2
1.0148	3.890E+05	3.2179E+05	3.9638E+13	45.0	2.49E-06	4.103E-06	1.202E-04	6.67E-08	4.50E-04	3

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 0.7625 M

COLLECTION AREA = 5.812E-01 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.372E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.940E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 4.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 2.616E-04 AMPS
CORONA WIRE LENGTH = 1.906E+00 M
DEPOSIT E FIELD = 4.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0094	3.890E+05	3.2082E+05	3.9850E+13	45.0	2.07E-06	2.732E-06	8.004E-05	5.55E-08	4.50E-04	4
1.0060	3.890E+05	3.2082E+05	3.9984E+13	45.0	1.76E-06	1.940E-06	5.683E-05	4.62E-08	4.50E-04	5
1.0039	3.890E+05	3.2082E+05	4.0070E+13	45.0	1.56E-06	1.426E-06	4.178E-05	3.85E-08	4.50E-04	6

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 1.5250 M

COLLECTION AREA = 1.162E+00 M2
WIRE TO PLATE = 1.270E-01 M
CURRENT/M = 1.372E-04 AMP/M
1/2 WIRE TO WIRE = 6.350E-02 M
TEMPERATURE = 297.667 K
ION MOBILITY = 1.798E-04 M2/VOLT-SEC
DUST WEIGHT = 3.250E-06 KG/SEC

APPLIED VOLTAGE = 4.760E+04 VOLTS
CORONA WIRE RADIUS = 1.191E-03 M
CURRENT DENSITY = 4.501E-04 AMP/M2
GAS FLOW RATE = 9.460E-02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 4.439E+02 M/SEC
LENGTH INCR. =0.25416565 M

TOTAL CURRENT = 5.233E-04 AMPS
CORONA WIRE LENGTH = 3.812E+00 M
DEPOSIT E FIELD = 4.501E+03 VOLT/M
GAS VELOCITY = 9.760E-01 M/SEC
VISCOSITY = 1.800E-05 KG/M-SEC
PART. PATH PARAM. = 5.708E-08 M
INPUT EFF./INCR. = 21.93

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0024	3.748E+05	3.1258E+05	4.1645E+13	45.0	1.44E-06	1.045E-06	3.062E-05	3.12E-08	4.50E-04	7
1.0016	3.748E+05	3.1258E+05	4.1680E+13	45.0	1.35E-06	8.028E-07	2.352E-05	2.61E-08	4.50E-04	8
1.0010	3.748E+05	3.1258E+05	4.1703E+13	45.0	1.26E-06	6.250E-07	1.831E-05	2.19E-08	4.50E-04	9

1,0007	3,748E+05	3,1258E+05	4,1718E+13	45,0	1,17E-06	4,917E-07	1,440E-05	1,84E-08	4,50E-04	10
1,0004	3,748E+05	3,1258E+05	4,1727E+13	45,0	1,09E-06	3,903E-07	1,143E-05	1,55E-08	4,50E-04	11
1,0003	3,748E+05	3,1258E+05	4,1733E+13	45,0	1,04E-06	3,118E-07	9,135E-06	1,31E-08	4,50E-04	12

EST, EFFICIENCY = 94,88 UNCORRECTED COMPUTED EFFICIENCY = 95,95

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

LAB ESP; SCA=125 FT2/1000ACFM; J=45 NA/CM2

CALCULATION IS IN SECTION NO, = 1 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 1,372E-04 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,940E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 4,501E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 2,616E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 4,501E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 23,45

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0390	3,890E+05	3,2281E+05	3,8716E+13	45,0	6,53E-06	1,224E-05	3,587E-04	6,56E-08	4,50E-04	1
1,0246	3,890E+05	3,2187E+05	3,9259E+13	45,0	3,45E-06	6,852E-06	2,007E-04	7,86E-08	4,50E-04	2
1,0152	3,890E+05	3,2187E+05	3,9622E+13	45,0	2,49E-06	4,102E-06	1,202E-04	6,67E-08	4,50E-04	3

CALCULATION IS IN SECTION NO, = 2 AND THE SECTION LENGTH IS = 0,7625 M

COLLECTION AREA = 5,812E-01 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 1,372E-04 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,940E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 4,501E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 2,616E-04 AMPS
CORONA WIRE LENGTH = 1,906E+00 M
DEPOSIT E FIELD = 4,501E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 23,45

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,
1,0095	3,890E+05	3,2082E+05	3,9847E+13	45,0	2,07E-06	2,731E-06	8,001E-05	5,53E-08	4,50E-04	4
1,0059	3,890E+05	3,2082E+05	3,9987E+13	45,0	1,76E-06	1,939E-06	5,681E-05	4,62E-08	4,50E-04	5
1,0037	3,890E+05	3,2082E+05	4,0074E+13	45,0	1,56E-06	1,426E-06	4,177E-05	3,85E-08	4,50E-04	6

CALCULATION IS IN SECTION NO, = 3 AND THE SECTION LENGTH IS = 1,5250 M

COLLECTION AREA = 1,162E+00 M2
WIRE TO PLATE = 1,270E-01 M
CURRENT/M = 1,372E-04 AMP/M
1/2 WIRE TO WIRE = 6,350E-02 M
TEMPERATURE = 297,667 K
ION MOBILITY = 1,798E-04 M2/VOLT-SEC
DUST WEIGHT = 3,250E-06 KG/SEC

APPLIED VOLTAGE = 4,760E+04 VOLTS
CORONA WIRE RADIUS = 1,191E-03 M
CURRENT DENSITY = 4,501E-04 AMP/M2
GAS FLOW RATE = 9,460E-02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 4,439E+02 M/SEC
LENGTH INCR, =0,25416565 M

TOTAL CURRENT = 5,233E-04 AMPS
CORONA WIRE LENGTH = 3,812E+00 M
DEPOSIT E FIELD = 4,501E+03 VOLT/M
GAS VELOCITY = 9,760E-01 M/SEC
VISCOSITY = 1,800E-05 KG/M-SEC
PART, PATH PARAM, = 5,708E-08 M
INPUT EFF,/INCR, = 23,45

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR, NO,

1.0023	3.748E+05	3.1257E+05	4.1650E+13	45.0	1.44E-06	1.045E-06	3.062E-05	3.12E-08	4.50E-04	7
1.0014	3.748E+05	3.1257E+05	4.1685E+13	45.0	1.35E-06	8.026E-07	2.351E-05	2.61E-08	4.50E-04	8
1.0009	3.748E+05	3.1257E+05	4.1707E+13	45.0	1.26E-06	6.249E-07	1.831E-05	2.19E-08	4.50E-04	9
1.0006	3.748E+05	3.1257E+05	4.1720E+13	45.0	1.17E-06	4.916E-07	1.440E-05	1.84E-08	4.50E-04	10
1.0004	3.748E+05	3.1257E+05	4.1729E+13	45.0	1.09E-06	3.902E-07	1.143E-05	1.55E-08	4.50E-04	11
1.0002	3.748E+05	3.1257E+05	4.1735E+13	45.0	1.04E-06	3.118E-07	9.134E-06	1.31E-08	4.50E-04	12

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SRI THEORY USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	1.0378	1.0378	1.0378	1.0378	1.0378	1.0378	1.0378	1.0378
2	1.7594	1.7226	1.6722	1.6245	1.5638	1.5011	1.4533	1.4159
3	1.9623	1.8996	1.8279	1.7636	1.6843	1.6040	1.5438	1.4970
4	2.0824	2.0030	1.9183	1.8440	1.7536	1.6630	1.5955	1.5433
5	2.1674	2.0759	1.9818	1.9004	1.8020	1.7041	1.6315	1.5755
6	2.2331	2.1320	2.0307	1.9437	1.8392	1.7357	1.6591	1.6001
7	2.2824	2.1727	2.0650	1.9733	1.8636	1.7554	1.6756	1.6143
8	2.3243	2.2074	2.0944	1.9987	1.8847	1.7726	1.6901	1.6267
9	2.3607	2.2377	2.1201	2.0209	1.9032	1.7877	1.7028	1.6378
10	2.3930	2.2645	2.1428	2.0407	1.9197	1.8012	1.7143	1.6477
11	2.4219	2.2886	2.1633	2.0585	1.9346	1.8134	1.7246	1.6567
12	2.4480	2.3103	2.1819	2.0746	1.9481	1.8246	1.7341	1.6649

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	1.0378	1.0378	1.0378	1.0378	1.0378	1.0378	1.0378
2	1.3726	1.3305	1.2865	1.2435	1.2005	1.1557	1.1121
3	1.4434	1.3916	1.3378	1.2857	1.2339	1.1802	1.1284
4	1.4837	1.4262	1.3669	1.3096	1.2527	1.1941	1.1376
5	1.5117	1.4503	1.3871	1.3261	1.2657	1.2036	1.1440
6	1.5331	1.4687	1.4025	1.3387	1.2756	1.2109	1.1489
7	1.5447	1.4780	1.4095	1.3437	1.2788	1.2126	1.1489
8	1.5550	1.4862	1.4095	1.3437	1.2788	1.2126	1.1489
9	1.5641	1.4937	1.4095	1.3437	1.2788	1.2126	1.1489
10	1.5724	1.4937	1.4095	1.3437	1.2788	1.2126	1.1489
11	1.5799	1.4937	1.4095	1.3437	1.2788	1.2126	1.1489
12	1.5799	1.4937	1.4095	1.3437	1.2788	1.2126	1.1489

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2500E-06	0.3500E-06	0.4500E-06	0.5500E-06	0.7000E-06	0.9000E-06	0.1100E-05	0.1300E-05
1	0.20292E-17	0.35882E-17	0.56234E-17	0.81363E-17	0.12804E-16	0.20705E-16	0.30524E-16	0.42263E-16
2	0.34400E-17	0.59560E-17	0.90606E-17	0.12736E-16	0.19293E-16	0.29947E-16	0.42746E-16	0.57660E-16
3	0.38368E-17	0.65678E-17	0.99043E-17	0.13826E-16	0.20779E-16	0.32000E-16	0.45406E-16	0.60964E-16
4	0.40716E-17	0.69254E-17	0.10394E-16	0.14457E-16	0.21634E-16	0.33176E-16	0.46927E-16	0.62848E-16
5	0.42378E-17	0.71775E-17	0.10738E-16	0.14899E-16	0.22232E-16	0.33998E-16	0.47986E-16	0.64160E-16
6	0.43663E-17	0.73716E-17	0.11003E-16	0.15238E-16	0.22690E-16	0.34627E-16	0.48797E-16	0.65163E-16
7	0.44626E-17	0.75122E-17	0.11189E-16	0.15470E-16	0.22992E-16	0.35021E-16	0.49284E-16	0.65740E-16
8	0.45446E-17	0.76322E-17	0.11348E-16	0.15669E-16	0.23252E-16	0.35363E-16	0.49708E-16	0.66246E-16
9	0.46159E-17	0.77369E-17	0.11487E-16	0.15844E-16	0.23480E-16	0.35665E-16	0.50083E-16	0.66695E-16
10	0.46789E-17	0.78295E-17	0.11611E-16	0.15999E-16	0.23684E-16	0.35934E-16	0.50420E-16	0.67099E-16
11	0.47354E-17	0.79127E-17	0.11722E-16	0.16138E-16	0.23868E-16	0.36178E-16	0.50725E-16	0.67466E-16
12	0.47866E-17	0.79880E-17	0.11822E-16	0.16265E-16	0.24035E-16	0.36400E-16	0.51004E-16	0.67802E-16

	0.1600E-05	0.2000E-05	0.2600E-05	0.3500E-05	0.5000E-05	0.8000E-05	0.1500E-04
1	0.63472E-16	0.98470E-16	0.16537E-15	0.29812E-15	0.60579E-15	0.15452E-14	0.54174E-14
2	0.83950E-16	0.12624E-15	0.20499E-15	0.35721E-15	0.70074E-15	0.17207E-14	0.58052E-14
3	0.88279E-16	0.13203E-15	0.21318E-15	0.36933E-15	0.72022E-15	0.17572E-14	0.58904E-14
4	0.90743E-16	0.13532E-15	0.21781E-15	0.37618E-15	0.73121E-15	0.17778E-14	0.59385E-14
5	0.92456E-16	0.13761E-15	0.22103E-15	0.38093E-15	0.73881E-15	0.17921E-14	0.59717E-14
6	0.93764E-16	0.13935E-15	0.22348E-15	0.38454E-15	0.74460E-15	0.18029E-14	0.59970E-14
7	0.94475E-16	0.14024E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14
8	0.95101E-16	0.14102E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14
9	0.95660E-16	0.14172E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14
10	0.96164E-16	0.14172E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14
11	0.96624E-16	0.14172E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14
12	0.96624E-16	0.14172E-15	0.22460E-15	0.38598E-15	0.74648E-15	0.18053E-14	0.59970E-14

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.500E-07	1.590	0.000	0.0012	0.0005	94.0060	11.451	5.9940	94.0060	11.451	5.9940
3.500E-07	1.414	0.400	2.3168	1.0988	94.0478	11.480	5.9522	93.7267	11.266	6.2733
4.500E-07	1.320	0.600	3.2328	1.5530	94.4630	11.774	5.5370	94.0895	11.508	5.9105
5.500E-07	1.261	1.667	8.0088	3.7494	95.0631	12.241	4.9369	94.8640	12.080	5.1360
7.000E-07	1.205	5.000	20.3516	9.5966	95.8171	12.915	4.1829	95.6173	12.725	4.3827
9.000E-07	1.159	4.933	15.7140	7.6950	96.7264	13.912	3.2736	96.4380	13.569	3.5620
1.100E-06	1.130	4.733	11.9769	6.1735	97.3995	14.849	2.6005	97.0216	14.297	2.9784
1.300E-06	1.110	4.000	8.0664	4.5442	97.9276	15.773	2.0724	97.4059	14.859	2.5941
1.600E-06	1.090	8.000	11.9816	7.5001	98.4609	16.983	1.5391	97.8592	15.641	2.1408
2.000E-06	1.072	6.667	6.9207	5.4440	98.9332	18.475	1.0668	98.1354	16.203	1.8646
2.600E-06	1.055	10.667	6.7164	7.8597	99.3529	20.509	0.6471	98.3175	16.621	1.6825
3.500E-06	1.041	10.667	3.5211	7.3274	99.6608	23.136	0.3392	98.4314	16.906	1.5686
5.000E-06	1.029	11.333	1.1523	9.9235	99.8955	27.928	0.1045	98.0005	15.918	1.9995
8.000E-06	1.018	12.000	0.0379	11.6483	99.9968	42.055	0.0032	97.7835	15.499	2.2165
1.500E-05	1.010	19.333	0.0019	15.8858	99.9999	74.368	0.0001	98.1237	16.177	1.8763

EFFICIENCY = STATED = 95.95 COMPUTED = 98.9546 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.9724
MMD OF INLET SIZE DISTRIBUTION = 3.302E+00
SIGMAP OF INLET SIZE DISTRIBUTION = 2.164E+00
LOG-NORMAL GOODNESS OF FIT = 0.935
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.181E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.596E+00
LOG-NORMAL GOODNESS OF FIT = 0.963
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 18.627

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 97.7165
CORRECTED MMD OF EFFLUENT = 2.713E+00
CORRECTED SIGMAP OF EFFLUENT = 2.273E+00
LOG-NORMAL GOODNESS OF FIT = 0.905
CORRECTED PRECIPITATION RATE PARAMETER = 15.38

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
4.925E+00	7.020E+01	2.555E-05	1.167E-03	1.193E-03	4.360E-02	2.500E-07
5.290E+00	7.275E+01	7.151E-02	3.857E-03	7.537E-02	1.022E-01	3.500E-07
5.743E+00	7.562E+01	1.286E-01	8.677E-03	1.373E-01	1.784E-01	4.500E-07
6.229E+00	7.837E+01	3.900E-01	1.573E-02	4.058E-01	2.642E-01	5.500E-07
6.981E+00	8.202E+01	6.282E-01	3.001E-02	6.582E-01	7.953E-01	7.000E-07
7.996E+00	8.599E+01	6.253E-01	5.510E-02	6.804E-01	1.132E+00	9.000E-07
9.010E+00	8.908E+01	5.833E-01	8.478E-02	6.681E-01	1.424E+00	1.100E-06
1.002E+01	9.148E+01	4.647E-01	1.170E-01	5.816E-01	1.661E+00	1.300E-06
1.152E+01	9.411E+01	4.233E-01	1.655E-01	5.888E-01	3.831E+00	1.600E-06
1.349E+01	9.636E+01	3.062E-01	2.290E-01	5.353E-01	4.234E+00	2.000E-06
1.638E+01	9.822E+01	1.923E-01	3.077E-01	5.000E-01	8.791E+00	2.600E-06
2.075E+01	9.939E+01	1.087E-01	3.939E-01	5.025E-01	1.044E+01	3.500E-06
2.793E+01	9.990E+01	2.523E-02	4.577E-01	4.829E-01	1.709E+01	5.000E-06
4.206E+01	1.000E+02	6.586E-04	4.492E-01	4.499E-01	2.114E+01	8.000E-06
7.437E+01	1.000E+02	2.390E-05	4.522E-01	4.522E-01	2.887E+01	1.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 97.7165 % SCA = 2.458E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.850E+04 V

AVG. CURRENT DENSITY = 45.01 NA/CM**2

RESISTIVITY = 1.000E+09 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 3.302E+00 UM INLET SIGMAP = 2.164E+00

OUTLET MMD = 2.713E+00 UM OUTLET SIGMAP = 2.273E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111

APPENDIX H

OUTPUT DATA FROM EXAMPLE 8

```
**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    T.E.P.L.-R.T.P. AND SO.R.I.     *
*                                    *
*        REVISION 1,JAN. 1, 1978     *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT = 14   NDATA =  1

DATA ON CARD NUMBER   2

PLANT A: SCA=243FT2/1000ACFM;VO=41.7KV;CALC. V-I;ANALYSIS OF NONIDEAL EFFECTS

DATA ON CARD NUMBER   3

NEST =  1  NDIST =  1  NVI =  2  NX = 15  NY = 15  NITER =  1  NCALC =  1  NRAPD =  9  NEFF =  1  NTEMP =  1  NONID =  9

DATA ON CARD NUMBER   4

IFINAL = 20  JI1 =  2  JI2 = 20  VISKIP = 1  VISAME =  1

DATA ON CARD NUMBER   5

DL =  1.96600 GRN/ACF  PL =  27.0000 FT  ETAD = 99.60000 %  DD =  2270.00 KG/M**3  EPS =  1.000E+02
VRATIO =   1.2000  US = 0.000270 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  5.00E+10 OHM-CM

DATA ON CARD NUMBER   6

ARDSO( 2) =  2.0 UM  ARSIGM( 2) =  2.5
ARDSO( 3) = 10.0 UM  ARSIGM( 3) =  2.5
ARDSO( 4) = 15.0 UM  ARSIGM( 4) =  2.5
ARDSO( 5) = 20.0 UM  ARSIGM( 5) =  2.5
```

ARD50(6) = 10.0 UM ARSIGM(6) = 1.5

ARD50(7) = 10.0 UM ARSIGM(7) = 5.0

ARD50(8) = 10.0 UM ARSIGM(8) = 10.0

ARD50(9) = 10.0 UM ARSIGM(9) = 15.0

DATA ON CARD NUMBER 7

ABNUCK(1) = 0.00 AZIGGY(1) = 0.00 AZNUMS(1) = 4.0

ABNUCK(2) = 0.10 AZIGGY(2) = 0.25 AZNUMS(2) = 4.0

ABNUCK(3) = 0.30 AZIGGY(3) = 0.25 AZNUMS(3) = 4.0

ABNUCK(4) = 0.50 AZIGGY(4) = 0.25 AZNUMS(4) = 4.0

ABNUCK(5) = 0.70 AZIGGY(5) = 0.25 AZNUMS(5) = 4.0

ABNUCK(6) = 0.10 AZIGGY(6) = 0.10 AZNUMS(6) = 4.0

DATA ON CARD NUMBER 8

ABNUCK(7) = 0.10 AZIGGY(7) = 0.40 AZNUMS(7) = 4.0

ABNUCK(8) = 0.10 AZIGGY(8) = 0.60 AZNUMS(8) = 4.0

ABNUCK(9) = 0.10 AZIGGY(9) = 0.80 AZNUMS(9) = 4.0

DATA ON CARD NUMBER 9

ENDPT(1) = 0.100 UM ENDPT(2) = 0.300 UM ENDPT(3) = 0.500 UM ENDPT(4) = 0.900 UM ENDPT(5) = 1.300 UM

ENDPT(6) = 1.900 UM ENDPT(7) = 3.100 UM ENDPT(8) = 3.900 UM ENDPT(9) = 5.100 UM ENDPT(10) = 6.900 UM

DATA ON CARD NUMBER 10

ENDPT(11) = 10.100 UM ENDPT(12) = 14.900 UM ENDPT(13) = 25.100 UM ENDPT(14) = 29.900 UM

DATA ON CARD NUMBER 11

PRCU(1) = 0.0000 % PRCU(2) = 0.0330 % PRCU(3) = 0.2860 % PRCU(4) = 1.1890 % PRCU(5) = 2.0040 %

PRCU(6) = 3.5240 % PRCU(7) = 7.0480 % PRCU(8) = 8.7000 % PRCU(9) = 10.3520 % PRCU(10) = 12.3340 %

DATA ON CARD NUMBER 12

PRCU(11) = 15.6380 % PRCU(12) = 20.4840 % PRCU(13) = 32.5990 % PRCU(14) = 100.0000 %

DATA ON CARD NUMBER 13

NUMSEC = 3 LSECT(1) = 15 LSECT(2) = 15 LSECT(3) = 15

DATA ON CARD NUMBER 14

AS(1) = 2.6460E+04 FT**2 VOS(1) = 4.1700E+04 V TCS(1) = 2.7300E-01 A WLS(1) = 1.5720E+04 FT
ACS(1) = 8.2500E-02 IN BS(1) = 5.5000E+00 IN NWS(1) = 1.2000E+01

DATA ON CARD NUMBER 15

SYS(1) = 3.6000E+00 IN VGS(1) = 3.2724E+05 FT**3/MIN VGASS(1) = 4.1000E+00 FT/SEC TEMPS(1) = 3.1500E+02 F
PS(1) = 1.0000E+00 ATM VISS(1) = 2.2900E-05 KG/M-SEC LINCS(1) = 6.0000E-01 FT

DATA ON CARD NUMBER 16

RFS(1) = 8.5000E-01 START1(1) = 1.0000E+04 A/M**2 START2(1) = 5.0000E-05 A/M**2
START3(1) = 5.0000E-05 A/M**2 VSTAR(1) = 3.6000E+04 V

DATA ON CARD NUMBER 17

AS(2) = 2.6460E+04 FT**2 VOS(2) = 4.1700E+04 V TCS(2) = 2.7300E-01 A WLS(2) = 1.5720E+04 FT
ACS(2) = 8.2500E-02 IN BS(2) = 5.5000E+00 IN NWS(2) = 1.2000E+01

DATA ON CARD NUMBER 18

SYS(2) = 3.6000E+00 IN VGS(2) = 3.2724E+05 FT**3/MIN VGASS(2) = 4.1000E+00 FT/SEC TEMPS(2) = 3.1500E+02 F
PS(2) = 1.0000E+00 ATM VISS(2) = 2.2900E-05 KG/M-SEC LINCS(2) = 6.0000E-01 FT

DATA ON CARD NUMBER 19

RFS(2) = 8.5000E-01 START1(2) = 1.0000E+04 A/M**2 START2(2) = 5.0000E-05 A/M**2
START3(2) = 5.0000E-05 A/M**2 VSTAR(2) = 3.6000E+04 V

DATA ON CARD NUMBER 20

AB(3) = 2.6460E+04 FT**2 VOB(3) = 8.1700E+04 V TCB(3) = 2.7300E-01 A HLB(3) = 1.5720E+04 FT

ACB(3) = 8.2500E-02 IN BB(3) = 5.5000E+00 IN NMB(3) = 1.2000E+01

DATA ON CARD NUMBER 21

SYB(3) = 3.6000E+00 IN VGB(3) = 3.2724E+05 FT**3/MIN VGASB(3) = 4.1000E+00 FT/SEC TEMPB(3) = 3.1500E+02 F

PB(3) = 1.0000E+00 ATM VISB(3) = 2.2900E-05 KG/M*SEC LINCB(3) = 6.0000E-01 FT

DATA ON CARD NUMBER 22

RFB(3) = 8.5000E-01 START1(3) = 1.0000E+04 A/M**2 START2(3) = 5.0000E-05 A/M**2

START3(3) = 5.0000E-05 A/M**2 VSTAR(3) = 3.6000E+04 V

CLEAN GAS VOLTAGE-CURRENT DENSITY-FIELD AT THE PLATE RELATIONSHIP FOR SECTION NO. 1

VW = -3.7657E+04 ACDNTY = 9.9159E-05 AEPLT = -1.4199E+05

VW = -3.8759E+04 ACDNTY = 1.4881E-04 AEPLT = -1.5437E+05

VW = -3.9736E+04 ACDNTY = 1.9847E-04 AEPLT = -1.6561E+05

VW = -4.0627E+04 ACDNTY = 2.4810E-04 AEPLT = -1.7598E+05

VW = -4.1459E+04 ACDNTY = 2.9776E-04 AEPLT = -1.8570E+05

VW = -4.2242E+04 ACDNTY = 3.4740E-04 AEPLT = -1.9486E+05

VW = -4.1594E+04 ACDNTY = 3.1004E-04 AEPLT = -1.8787E+05

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

PLANT A: SCA=243FT2/1000ACFM;VD=81.7KV;CALC, V=I;ANALYSIS OF NONIDEAL EFFECTS

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 2.461E+03 M2	APPLIED VOLTAGE = 4.170E+04 VOLTS	TOTAL CURRENT = 7.629E-01 AMPS
WIRE TO PLATE = 1.397E-01 M	CORONA WIRE RADIUS = 2.096E-03 M	CORONA WIRE LENGTH = 4.795E+03 M
CURRENT/M = 1.591E-04 AMP/M	CURRENT DENSITY = 3.100E-04 AMP/M2	DEPOSIT E FIELD = 1.550E+05 VOLT/M
1/2 WIRE TO WIRE = 9.144E-02 M.	GAS FLOW RATE = 1.548E+02 M3/SEC	GAS VELOCITY = 1.250E+00 M/SEC
TEMPERATURE = 430.000 K	PRESSURE = 1.000 ATM	VISCOSITY = 2.290E-05 KG/M-SEC
ION MOBILITY = 4.250E-04 M2/VOLT-SEC	MEAN THERMAL SPEED = 5.335E+02 M/SEC	PART. PATH PARAM. = 8.246E-08 M
DUST WEIGHT = 6.969E-01 KG/SEC	LENGTH INCR. =0.1830000 M	INPUT EFF./INCR. = 11.55

RIOVR	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0.3924	1.750E+05	1.8787E+05	1.7546E+13	12.2	2.29E-05	1.206E-03	6.826E-02	8.75E-07	3.09E-04	1
0.3325	1.750E+05	1.8787E+05	1.7580E+13	10.3	2.04E-05	1.130E-03	6.419E-02	1.16E-06	3.09E-04	2
0.3405	1.750E+05	1.8787E+05	1.7592E+13	10.6	1.41E-05	7.285E-04	4.124E-02	9.64E-07	3.09E-04	3
0.3529	1.750E+05	1.8787E+05	1.7597E+13	10.9	8.49E-06	4.440E-04	2.513E-02	7.74E-07	3.09E-04	4
0.3656	1.750E+05	1.8787E+05	1.7601E+13	11.3	4.52E-06	2.691E-04	1.523E-02	6.35E-07	3.09E-04	5
0.3781	1.750E+05	1.8787E+05	1.7603E+13	11.7	2.38E-06	1.666E-04	9.431E-03	5.39E-07	3.09E-04	6
0.3904	1.750E+05	1.8787E+05	1.7604E+13	12.1	1.77E-06	1.073E-04	6.076E-03	4.72E-07	3.10E-04	7
0.4026	1.750E+05	1.8787E+05	1.7606E+13	12.5	1.37E-06	7.282E-05	4.122E-03	4.24E-07	3.10E-04	8
0.4147	1.750E+05	1.8787E+05	1.7606E+13	12.9	1.10E-06	5.227E-05	2.959E-03	3.88E-07	3.10E-04	9
0.4269	1.750E+05	1.8787E+05	1.7607E+13	13.2	8.22E-07	3.958E-05	2.241E-03	3.58E-07	3.10E-04	10
0.4391	1.750E+05	1.8787E+05	1.7608E+13	13.6	6.65E-07	3.137E-05	1.776E-03	3.34E-07	3.10E-04	11

0,4514	1,750E+05	1,8787E+05	1,7608E+13	14,0	5,80E-07	2,577E-05	1,459E-03	3,12E-07	3,10E-04	12
0,4638	1,750E+05	1,8787E+05	1,7609E+13	14,4	5,23E-07	2,174E-05	1,231E-03	2,93E-07	3,10E-04	13
0,4762	1,750E+05	1,8787E+05	1,7609E+13	14,8	4,83E-07	1,871E-05	1,059E-03	2,75E-07	3,10E-04	14
0,4886	1,750E+05	1,8787E+05	1,7609E+13	15,2	4,52E-07	1,632E-05	9,238E-04	2,59E-07	3,10E-04	15

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2,7450 M

COLLECTION AREA = 2,461E+03 M2
WIRE TO PLATE = 1,397E-01 M
CURRENT/M = 1,591E-04 AMP/M
1/2 WIRE TO WIRE = 9,144E-02 M
TEMPERATURE = 430,000 K
ION MOBILITY = 4,250E-04 M2/VOLT-SEC
DUST WEIGHT = 6,969E-01 KG/SEC

APPLIED VOLTAGE = 4,170E+04 VOLTS
CORONA WIRE RADIUS = 2,096E-03 M
CURRENT DENSITY = 3,100E-04 AMP/M2
GAS FLOW RATE = 1,548E+02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 5,335E+02 M/SEC
LENGTH INCR. =0,18300000 M

TOTAL CURRENT = 7,629E-01 AMPS
CORONA WIRE LENGTH = 4,795E+03 M
DEPOSIT E FIELD = 1,550E+05 VOLT/M
GAS VELOCITY = 1,250E+00 M/SEC
VISCOSITY = 2,290E-05 KG/M-SEC
PART. PATH PARAM. = 8,246E-08 M
INPUT EFF./INCR. = 11,55

RIOVR	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0,5012	1,750E+05	1,8787E+05	1,7610E+13	15,5	4,29E-07	1,437E-05	8,133E-04	2,44E-07	3,10E-04	16
0,5138	1,750E+05	1,8787E+05	1,7610E+13	15,9	4,11E-07	1,275E-05	7,215E-04	2,29E-07	3,10E-04	17
0,5264	1,750E+05	1,8787E+05	1,7610E+13	16,3	3,91E-07	1,138E-05	6,441E-04	2,16E-07	3,10E-04	18
0,5392	1,750E+05	1,8787E+05	1,7611E+13	16,7	3,60E-07	1,021E-05	5,780E-04	2,03E-07	3,10E-04	19
0,5520	1,750E+05	1,8787E+05	1,7611E+13	17,1	3,35E-07	9,201E-06	5,208E-04	1,91E-07	3,10E-04	20
0,5647	1,750E+05	1,8787E+05	1,7611E+13	17,5	3,14E-07	8,323E-06	4,711E-04	1,80E-07	3,10E-04	21
0,5773	1,750E+05	1,8787E+05	1,7611E+13	17,9	2,97E-07	7,552E-06	4,275E-04	1,69E-07	3,10E-04	22
0,5899	1,750E+05	1,8787E+05	1,7611E+13	18,3	2,82E-07	6,873E-06	3,891E-04	1,60E-07	3,10E-04	23
0,6022	1,750E+05	1,8787E+05	1,7612E+13	18,7	2,69E-07	6,270E-06	3,549E-04	1,50E-07	3,10E-04	24
0,6145	1,750E+05	1,8787E+05	1,7612E+13	19,1	2,59E-07	5,733E-06	3,245E-04	1,42E-07	3,10E-04	25
0,6265	1,750E+05	1,8787E+05	1,7612E+13	19,4	2,49E-07	5,253E-06	2,974E-04	1,34E-07	3,10E-04	26
0,6382	1,750E+05	1,8787E+05	1,7612E+13	19,8	2,41E-07	4,821E-06	2,729E-04	1,26E-07	3,10E-04	27
0,6497	1,750E+05	1,8787E+05	1,7612E+13	20,2	2,34E-07	4,433E-06	2,510E-04	1,19E-07	3,10E-04	28
0,6610	1,750E+05	1,8787E+05	1,7612E+13	20,5	2,28E-07	4,083E-06	2,311E-04	1,13E-07	3,10E-04	29
0,6721	1,750E+05	1,8787E+05	1,7612E+13	20,8	2,23E-07	3,765E-06	2,131E-04	1,07E-07	3,10E-04	30

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2,7450 M

COLLECTION AREA = 2,461E+03 M2
WIRE TO PLATE = 1,397E-01 M
CURRENT/M = 1,591E-04 AMP/M
1/2 WIRE TO WIRE = 9,144E-02 M
TEMPERATURE = 430,000 K
ION MOBILITY = 4,250E-04 M2/VOLT-SEC
DUST WEIGHT = 6,969E-01 KG/SEC

APPLIED VOLTAGE = 4,170E+04 VOLTS
CORONA WIRE RADIUS = 2,096E-03 M
CURRENT DENSITY = 3,100E-04 AMP/M2
GAS FLOW RATE = 1,548E+02 M3/SEC
PRESSURE = 1,000 ATM
MEAN THERMAL SPEED = 5,335E+02 M/SEC
LENGTH INCR. =0,18300000 M

TOTAL CURRENT = 7,629E-01 AMPS
CORONA WIRE LENGTH = 4,795E+03 M
DEPOSIT E FIELD = 1,550E+05 VOLT/M
GAS VELOCITY = 1,250E+00 M/SEC
VISCOSITY = 2,290E-05 KG/M-SEC
PART. PATH PARAM. = 8,246E-08 M
INPUT EFF./INCR. = 11,55

RIOVR	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
0,6829	1,750E+05	1,8787E+05	1,7612E+13	21,2	2,18E-07	3,477E-06	1,968E-04	1,01E-07	3,10E-04	31
0,6934	1,750E+05	1,8787E+05	1,7612E+13	21,5	2,14E-07	3,215E-06	1,820E-04	9,56E-08	3,10E-04	32
0,7037	1,750E+05	1,8787E+05	1,7612E+13	21,8	2,10E-07	2,976E-06	1,685E-04	9,05E-08	3,10E-04	33
0,7138	1,750E+05	1,8787E+05	1,7612E+13	22,1	2,07E-07	2,758E-06	1,561E-04	8,58E-08	3,10E-04	34
0,7236	1,750E+05	1,8787E+05	1,7612E+13	22,4	2,04E-07	2,559E-06	1,449E-04	8,13E-08	3,10E-04	35
0,7331	1,750E+05	1,8787E+05	1,7612E+13	22,7	2,01E-07	2,376E-06	1,345E-04	7,71E-08	3,10E-04	36
0,7424	1,750E+05	1,8787E+05	1,7612E+13	23,0	2,00E-07	2,209E-06	1,250E-04	7,31E-08	3,10E-04	37
0,7515	1,750E+05	1,8787E+05	1,7612E+13	23,3	2,00E-07	2,055E-06	1,163E-04	6,94E-08	3,10E-04	38
0,7603	1,750E+05	1,8787E+05	1,7612E+13	23,6	2,00E-07	1,913E-06	1,083E-04	6,59E-08	3,10E-04	39
0,7688	1,750E+05	1,8787E+05	1,7612E+13	23,8	2,00E-07	1,783E-06	1,009E-04	6,26E-08	3,10E-04	40
0,7771	1,750E+05	1,8787E+05	1,7612E+13	24,1	2,00E-07	1,663E-06	9,412E-05	5,94E-08	3,10E-04	41
0,7852	1,750E+05	1,8787E+05	1,7612E+13	24,3	2,00E-07	1,552E-06	8,784E-05	5,65E-08	3,10E-04	42
0,7930	1,750E+05	1,8787E+05	1,7612E+13	24,6	2,00E-07	1,449E-06	8,203E-05	5,37E-08	3,10E-04	43

0,8006	1,750E+05	1,8787E+05	1,7612E+13	24,8	2,00E-07	1,354E-06	7,667E-05	5,11E-08	3,10E-04	44
0,8080	1,750E+05	1,87A7E+05	1,7612E+13	25,1	2,00E-07	1,266E-06	7,170E-05	4,86E-08	3,10E-04	45

DESIGN EFFICIENCY = 99,60 UNCORRECTED COMPUTED EFFICIENCY = 99,54

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SUM OF CLASSICAL FIELD AND DIFFUSIONAL CHARGES USED FOR PARTICLE CHARGING

INCREMENT NO. Q/QSATF FOR INDICATED PARTICLE SIZES

	0.2000E-06	0.4000E-06	0.7000E-06	0.1100E-05	0.1600E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	1.4490	1.2805	1.1023	0.9818	0.9038	0.8341	0.7952	0.7721
2	1.6905	1.4692	1.2525	1.1099	1.0191	0.9391	0.8948	0.8687
3	1.8283	1.5755	1.3361	1.1806	1.0823	0.9961	0.9487	0.9209
4	1.9232	1.6478	1.3922	1.2275	1.1239	1.0333	0.9837	0.9546
5	1.9946	1.7016	1.4334	1.2616	1.1538	1.0600	1.0086	0.9786
6	2.0515	1.7441	1.4656	1.2879	1.1768	1.0802	1.0274	0.9966
7	2.0985	1.7790	1.4918	1.3091	1.1951	1.0962	1.0422	1.0107
8	2.1386	1.8084	1.5137	1.3268	1.2103	1.1094	1.0543	1.0223
9	2.1734	1.8339	1.5325	1.3418	1.2232	1.1204	1.0645	1.0319
10	2.2042	1.8563	1.5490	1.3549	1.2343	1.1300	1.0732	1.0402
11	2.2318	1.8763	1.5636	1.3664	1.2440	1.1383	1.0808	1.0474
12	2.2567	1.8944	1.5767	1.3768	1.2528	1.1457	1.0875	1.0537
13	2.2796	1.9108	1.5886	1.3861	1.2606	1.1524	1.0935	1.0594
14	2.3006	1.9259	1.5995	1.3946	1.2678	1.1584	1.0990	1.0645
15	2.3200	1.9398	1.6096	1.4025	1.2743	1.1639	1.0990	1.0645
16	2.3381	1.9528	1.6189	1.4097	1.2803	1.1639	1.0990	1.0645
17	2.3550	1.9649	1.6275	1.4164	1.2803	1.1639	1.0990	1.0645
18	2.3708	1.9761	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
19	2.3857	1.9867	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
20	2.3998	1.9967	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
21	2.4131	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
22	2.4258	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
23	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
24	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
25	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
26	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
27	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
28	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
29	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
30	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
31	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
32	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
33	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
34	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
35	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
36	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
37	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
38	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
39	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
40	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
41	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
42	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
43	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
44	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645
45	2.4379	2.0062	1.6355	1.4164	1.2803	1.1639	1.0990	1.0645

0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04

1	0.7509	0.7311	0.7149	0.7011	0.6895
2	0.8449	0.8227	0.8048	0.7896	0.7823
3	0.8955	0.8720	0.8530	0.8369	0.8293
4	0.9282	0.9037	0.8839	0.8673	0.8594
5	0.9512	0.9260	0.9057	0.8886	0.8804
6	0.9685	0.9427	0.9219	0.9045	0.8961
7	0.9821	0.9558	0.9346	0.9168	0.9083
8	0.9932	0.9664	0.9448	0.9268	0.9182
9	1.0024	0.9752	0.9533	0.9350	0.9263
10	1.0102	0.9827	0.9606	0.9420	0.9332
11	1.0170	0.9892	0.9668	0.9481	0.9392
12	1.0231	0.9949	0.9723	0.9534	0.9445
13	1.0284	1.0000	0.9772	0.9582	0.9491
14	1.0333	1.0046	0.9816	0.9582	0.9491
15	1.0333	1.0046	0.9816	0.9582	0.9491
16	1.0333	1.0046	0.9816	0.9582	0.9491
17	1.0333	1.0046	0.9816	0.9582	0.9491
18	1.0333	1.0046	0.9816	0.9582	0.9491
19	1.0333	1.0046	0.9816	0.9582	0.9491
20	1.0333	1.0046	0.9816	0.9582	0.9491
21	1.0333	1.0046	0.9816	0.9582	0.9491
22	1.0333	1.0046	0.9816	0.9582	0.9491
23	1.0333	1.0046	0.9816	0.9582	0.9491
24	1.0333	1.0046	0.9816	0.9582	0.9491
25	1.0333	1.0046	0.9816	0.9582	0.9491
26	1.0333	1.0046	0.9816	0.9582	0.9491
27	1.0333	1.0046	0.9816	0.9582	0.9491
28	1.0333	1.0046	0.9816	0.9582	0.9491
29	1.0333	1.0046	0.9816	0.9582	0.9491
30	1.0333	1.0046	0.9816	0.9582	0.9491
31	1.0333	1.0046	0.9816	0.9582	0.9491
32	1.0333	1.0046	0.9816	0.9582	0.9491
33	1.0333	1.0046	0.9816	0.9582	0.9491
34	1.0333	1.0046	0.9816	0.9582	0.9491
35	1.0333	1.0046	0.9816	0.9582	0.9491
36	1.0333	1.0046	0.9816	0.9582	0.9491
37	1.0333	1.0046	0.9816	0.9582	0.9491
38	1.0333	1.0046	0.9816	0.9582	0.9491
39	1.0333	1.0046	0.9816	0.9582	0.9491
40	1.0333	1.0046	0.9816	0.9582	0.9491
41	1.0333	1.0046	0.9816	0.9582	0.9491
42	1.0333	1.0046	0.9816	0.9582	0.9491
43	1.0333	1.0046	0.9816	0.9582	0.9491
44	1.0333	1.0046	0.9816	0.9582	0.9491
45	1.0333	1.0046	0.9816	0.9582	0.9491

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.2000E-06	0.4000E-06	0.7000E-06	0.1100E-05	0.1600E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	0.25996E-17	0.70474E-17	0.17083E-16	0.36512E-16	0.70310E-16	0.15740E-15	0.29340E-15	0.47046E-15
2	0.30327E-17	0.80856E-17	0.19410E-16	0.41277E-16	0.79285E-16	0.17721E-15	0.33015E-15	0.52933E-15
3	0.32801E-17	0.86707E-17	0.20705E-16	0.43905E-16	0.84198E-16	0.18797E-15	0.35004E-15	0.56111E-15
4	0.34502E-17	0.90685E-17	0.21575E-16	0.45649E-16	0.87432E-16	0.19500E-15	0.36296E-15	0.58168E-15
5	0.35783E-17	0.93648E-17	0.22214E-16	0.46918E-16	0.89764E-16	0.20002E-15	0.37214E-15	0.59625E-15
6	0.36804E-17	0.95985E-17	0.22713E-16	0.47897E-16	0.91550E-16	0.20384E-15	0.37908E-15	0.60722E-15
7	0.37648E-17	0.97904E-17	0.23118E-16	0.48686E-16	0.92978E-16	0.20686E-15	0.38455E-15	0.61586E-15
8	0.38367E-17	0.99526E-17	0.23458E-16	0.49342E-16	0.94158E-16	0.20934E-15	0.38902E-15	0.62289E-15
9	0.38992E-17	0.10093E-16	0.23750E-16	0.49902E-16	0.95158E-16	0.21143E-15	0.39277E-15	0.62877E-15
10	0.39544E-17	0.10216E-16	0.24005E-16	0.50388E-16	0.96023E-16	0.21323E-15	0.39599E-15	0.63380E-15
11	0.40038E-17	0.10326E-16	0.24231E-16	0.50817E-16	0.96783E-16	0.21480E-15	0.39879E-15	0.63818E-15
12	0.40486E-17	0.10425E-16	0.24434E-16	0.51201E-16	0.97461E-16	0.21620E-15	0.40127E-15	0.64205E-15
13	0.40896E-17	0.10516E-16	0.24619E-16	0.51549E-16	0.98072E-16	0.21746E-15	0.40350E-15	0.64551E-15
14	0.41273E-17	0.10599E-16	0.24788E-16	0.51866E-16	0.98629E-16	0.21859E-15	0.40551E-15	0.64864E-15
15	0.41621E-17	0.10676E-16	0.24944E-16	0.52157E-16	0.99137E-16	0.21963E-15	0.40551E-15	0.64864E-15
16	0.41946E-17	0.10747E-16	0.25088E-16	0.52425E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
17	0.42249E-17	0.10813E-16	0.25221E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
18	0.42533E-17	0.10876E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
19	0.42801E-17	0.10934E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
20	0.43053E-17	0.10989E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
21	0.43292E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
22	0.43519E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
23	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
24	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
25	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
26	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
27	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
28	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
29	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
30	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
31	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
32	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
33	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
34	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
35	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
36	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
37	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
38	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
39	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
40	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
41	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
42	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
43	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
44	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15
45	0.43736E-17	0.11041E-16	0.25346E-16	0.52673E-16	0.99605E-16	0.21963E-15	0.40551E-15	0.64864E-15

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04
1	0.81278E-15	0.15873E-14	0.33557E-14	0.84233E-14	0.15773E-13
2	0.91450E-15	0.17863E-14	0.37775E-14	0.94859E-14	0.17767E-13
3	0.96929E-15	0.18932E-14	0.40038E-14	0.10055E-13	0.18835E-13
4	0.10047E-14	0.19621E-14	0.41491E-14	0.10420E-13	0.19518E-13

5	0.10296E-14	0.20105E-14	0.42512E-14	0.10676E-13	0.19997E-13
6	0.10484E-14	0.20468E-14	0.43274E-14	0.10866E-13	0.20353E-13
7	0.10631E-14	0.20752E-14	0.43869E-14	0.11015E-13	0.20631E-13
8	0.10750E-14	0.20982E-14	0.44349E-14	0.11134E-13	0.20854E-13
9	0.10850E-14	0.21173E-14	0.44749E-14	0.11234E-13	0.21039E-13
10	0.10935E-14	0.21336E-14	0.45088E-14	0.11318E-13	0.21196E-13
11	0.11009E-14	0.21477E-14	0.45381E-14	0.11391E-13	0.21332E-13
12	0.11074E-14	0.21601E-14	0.45640E-14	0.11455E-13	0.21451E-13
13	0.11132E-14	0.21712E-14	0.45870E-14	0.11511E-13	0.21557E-13
14	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
15	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
16	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
17	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
18	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
19	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
20	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
21	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
22	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
23	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
24	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
25	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
26	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
27	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
28	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
29	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
30	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
31	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
32	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
33	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
34	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
35	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
36	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
37	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
38	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
39	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
40	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
41	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
42	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
43	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
44	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13
45	0.11185E-14	0.21812E-14	0.46077E-14	0.11511E-13	0.21557E-13

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.3449	0.2091	98.7634	9.210	1.2366	98.5958	8.944	1.4042
4.000E-07	1.530	0.253	6.4038	3.5493	97.0053	7.356	2.9947	96.8906	7.277	3.1094
7.000E-07	1.297	0.903	24.0564	13.5814	96.8480	7.249	3.1520	96.6664	7.131	3.3336
1.100E-06	1.188	0.815	16.2242	9.9828	97.6447	7.859	2.3553	97.2851	7.562	2.7149
1.600E-06	1.130	1.520	20.1366	13.4177	98.4326	8.713	1.5674	98.0434	8.248	1.9566
2.500E-06	1.083	3.524	23.1421	18.4561	99.2230	10.185	0.7770	98.8392	9.343	1.1608
3.500E-06	1.059	1.652	5.6379	6.9089	99.5962	11.557	0.4038	99.0731	9.815	0.9269
4.500E-06	1.046	1.652	3.2086	6.8674	99.7702	12.739	0.2298	99.0786	9.827	0.9214
6.000E-06	1.035	1.982	0.7054	6.4886	99.9579	16.297	0.0421	99.2744	10.328	0.7256
8.500E-06	1.024	3.304	0.0695	7.2447	99.9975	22.227	0.0025	99.5140	11.168	0.4860
1.250E-05	1.017	4.846	0.0041	5.8079	99.9999	31.459	0.0001	99.7344	12.435	0.2656
2.000E-05	1.010	12.115	0.0102	4.7246	99.9999	48.821	0.0001	99.9136	14.789	0.0864
2.750E-05	1.008	67.401	0.0565	2.7615	99.9999	66.304	0.0001	99.9909	19.513	0.0091

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 2.969E+00
CORRECTED SIGMAP OF EFFLUENT = 2.729E+00
LOG-NORMAL GOODNESS OF FIT = 0.985
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,340E+01	6,077E-02	8,238E-03	6,900E-02	5,350E-02	2,000E-07
3,486E+00	8,104E+01	2,426E+00	9,293E-02	2,519E+00	2,806E-01	4,000E-07
3,918E+00	8,457E+01	7,922E+00	4,565E-01	8,378E+00	1,586E+00	7,000E-07
4,769E+00	8,972E+01	8,540E+00	1,304E+00	9,844E+00	2,834E+00	1,100E-06
5,911E+00	9,404E+01	1,027E+01	2,550E+00	1,282E+01	5,720E+00	1,600E-06
8,019E+00	9,782E+01	9,150E+00	4,520E+00	1,367E+01	1,308E+01	2,500E-06
1,037E+01	9,929E+01	4,753E+00	6,159E+00	1,091E+01	8,358E+00	3,500E-06
1,274E+01	9,977E+01	2,315E+00	6,967E+00	9,282E+00	1,105E+01	4,500E-06
1,630E+01	9,996E+01	4,517E-01	7,332E+00	7,783E+00	1,310E+01	6,000E-06
2,223E+01	1,000E+02	3,531E-02	6,859E+00	6,895E+00	1,545E+01	8,500E-06
3,146E+01	1,000E+02	2,022E-03	5,415E+00	5,418E+00	1,245E+01	1,250E-05
4,882E+01	1,000E+02	3,769E-03	3,285E+00	3,289E+00	1,013E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	5,722E+00	5,784E+00	5,918E+00	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.969E+00 UM OUTLET SIGMAP = 2.729E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.1911	97.1023	7.425	2.8977	96.7893	7.210	3.2107
4.000E-07	1.530	0.253	4.0629	2.7466	94.1940	5.968	5.8060	93.9799	5.892	6.0201
7.000E-07	1.297	0.903	15.5003	10.6579	93.7940	5.828	6.2060	93.4549	5.717	6.5451
1.100E-06	1.188	0.815	11.6397	8.5754	94.8365	6.214	5.1635	94.1651	5.957	5.8349
1.600E-06	1.130	1.520	16.8762	12.9942	95.9859	6.742	4.0141	95.2593	4.393	4.7407
2.500E-06	1.083	3.524	26.2590	21.6739	97.3060	7.578	2.6940	96.5894	7.083	3.4106
3.500E-06	1.059	1.652	9.0557	8.8137	98.0181	8.221	1.9819	97.0414	7.381	2.9586
4.500E-06	1.046	1.652	7.4341	8.6932	98.3730	8.635	1.6270	97.0819	7.410	2.9181
6.000E-06	1.035	1.982	4.2085	7.3047	99.2323	10.210	0.7677	97.9562	8.157	2.0438
8.500E-06	1.024	3.304	2.9758	7.3185	99.6744	12.008	0.3256	98.7717	9.224	1.2283
1.250E-05	1.017	4.846	1.6067	5.3809	99.8801	14.103	0.1199	99.3843	10.672	0.6157
2.000E-05	1.010	12.115	0.0981	3.5895	99.9971	21.887	0.0029	99.8357	13.442	0.1643
2.750E-05	1.008	67.401	0.0185	2.0605	99.9999	66.304	0.0001	99.9830	18.204	0.0170

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.013E+00
CORRECTED SIGMAP OF EFFLUENT = 2.562E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	1.53AE-02	1.578E-01	5.350E-02	2.000E-07
3.486E+00	8.104E+01	4.704E+00	1.735E-01	4.878E+00	2.806E-01	4.000E-07
3.918E+00	8.457E+01	1.560E+01	8.523E-01	1.645E+01	1.586E+00	7.000E-07
4.769E+00	8.972E+01	1.872E+01	2.434E+00	2.116E+01	2.834E+00	1.100E-06
5.911E+00	9.404E+01	2.630F+01	4.761E+00	3.106E+01	5.720E+00	1.600E-06
8.019E+00	9.782E+01	3.173E+01	8.439E+00	4.016E+01	1.30AE+01	2.500E-06
1.037E+01	9.929E+01	2.333E+01	1.150E+01	3.483E+01	8.358E+00	3.500E-06
1.274E+01	9.977E+01	1.639E+01	1.301E+01	2.940E+01	1.105E+01	4.500E-06
1.630E+01	9.996E+01	8.235F+00	1.369E+01	2.192E+01	1.310E+01	6.000E-06
2.223E+01	1.000E+02	4.619E+00	1.281E+01	1.743E+01	1.545E+01	8.500E-06
3.146E+01	1.000E+02	2.444E+00	1.011E+01	1.255E+01	1.245E+01	1.250E-05
4.882E+01	1.000E+02	1.113E-01	6.133E+00	6.244E+00	1.013E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	1.068E+01	1.074E+01	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 99.0455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.013E+00 UM OUTLET SIGMAP = 2.562E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.1541	92.7505	5.502	7.2495	92.1318	5.330	7.8682
4.000E-07	1.530	0.253	2.3354	1.8699	87.9714	4.441	12.0286	87.5482	4.368	12.4518
7.000E-07	1.297	0.903	8.8651	7.2161	87.2072	4.311	12.7928	86.5368	4.204	13.4632
1.100E-06	1.188	0.815	7.1634	6.1826	88.5468	4.543	11.4532	87.2196	4.313	12.7804
1.600E-06	1.130	1.520	11.5362	10.2186	90.1102	4.851	9.8898	88.6740	4.567	11.3260
2.500E-06	1.083	3.524	21.6945	19.7430	91.9780	5.290	8.0220	90.5614	4.949	9.4386
3.500E-06	1.059	1.652	9.0002	8.8546	92.9008	5.546	7.0992	90.9700	5.042	9.0300
4.500E-06	1.046	1.652	8.6513	9.1942	93.1761	5.629	6.8239	90.6236	4.963	9.3764
6.000E-06	1.035	1.982	7.3927	8.6857	95.1397	6.341	4.8603	92.6170	5.464	7.3830
8.500E-06	1.024	3.304	9.1127	10.5480	96.4060	6.973	3.5940	94.6215	6.128	5.3785
1.250E-05	1.017	4.846	9.0758	9.8394	97.5596	7.785	2.4404	96.5793	7.077	3.4207
2.000E-05	1.010	12.115	2.9234	4.5552	99.6856	12.081	0.3144	99.3665	10.613	0.6335
2.750E-05	1.008	67.401	2.0658	2.9386	99.9601	16.408	0.0399	99.9265	15.130	0.0735

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 3.758E+00
CORRECTED SIGMAP OF EFFLUENT = 2.603E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.562E-01	3.040E-02	3.866E-01	5.350E-02	2.000E-07
3.486E+00	8.104E+01	9.746E+00	3.430E-01	1.009E+01	2.806E-01	4.000E-07
3.918E+00	8.457E+01	3.215E+01	1.685E+00	3.384E+01	1.586E+00	7.000E-07
4.769E+00	8.97[illegible]E+01	4.153E+01	4.812E+00	4.634E+01	2.834E+00	1.100E-06
5.911E+00	9.404E+01	6.480E+01	9.411E+00	7.421E+01	5.720E+00	1.600E-06
8.019E+00	9.782E+01	9.447E+01	1.668E+01	1.112E+02	1.308E+01	2.500E-06
1.037E+01	9.929E+01	8.357E+01	2.273E+01	1.063E+02	8.358E+00	3.500E-06
1.274E+01	9.977E+01	6.875E+01	2.571E+01	9.446E+01	1.105E+01	4.500E-06
1.630E+01	9.996E+01	5.213E+01	2.706E+01	7.919E+01	1.310E+01	6.000E-06
2.223E+01	1.000E+02	5.098E+01	2.532E+01	7.630E+01	1.545E+01	8.500E-06
3.146E+01	1.000E+02	4.976E+01	1.999E+01	6.975E+01	1.245E+01	1.250E-05
4.882E+01	1.000E+02	1.195E+01	1.212E+01	2.407E+01	1.013E+01	2.000E-05
6.630E+01	1.000E+02	2.517E+01	2.112E+01	4.628E+01	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 3

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.758E+00 UM OUTLET SIGMAP = 2.603E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.1123	83.3481	3.759	16.6519	82.2256	3.622	17.7744
4.000E-07	1.530	0.253	1.3078	1.1716	76.5857	3.044	23.4143	75.8178	2.976	24.1822
7.000E-07	1.297	0.903	4.9032	4.4634	75.4048	2.941	24.5952	74.1886	2.840	25.8114
1.100E-06	1.188	0.815	4.1624	3.9863	76.8663	3.069	23.1337	74.4586	2.862	25.5414
1.600E-06	1.130	1.520	7.1693	6.9771	78.6357	3.236	21.3643	76.0302	2.995	23.9698
2.500E-06	1.083	3.524	14.9949	14.7410	80.7263	3.452	19.2737	78.1563	3.190	21.8437
3.500E-06	1.059	1.652	6.7415	6.9558	81.5156	3.540	18.4844	78.0128	3.176	21.9872
4.500E-06	1.046	1.652	6.7972	7.3608	81.3630	3.522	18.6370	76.7326	3.057	23.2674
6.000E-06	1.035	1.982	6.8997	7.7218	84.2318	3.873	15.7682	79.6554	3.339	20.3446
8.500E-06	1.024	3.304	10.1042	10.8128	86.1477	4.145	13.8523	82.9104	3.704	17.0896
1.250E-05	1.017	4.846	12.2164	12.2469	88.5813	4.550	11.4187	86.8029	4.246	13.1971
2.000E-05	1.010	12.115	9.2214	9.3414	96.5523	7.061	3.4477	95.9735	6.735	4.0265
2.750E-05	1.008	67.401	15.3608	14.1088	98.9677	9.589	1.0323	98.9069	9.469	1.0931

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 5.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 94.7780
CORRECTED MMD OF EFFLUENT = 6.192E+00
CORRECTED SIGMAP OF EFFLUENT = 3.065E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E-01	5.816E-02	8.734E-01	5.350E-02	2.000E-07
3.486E+00	8.104E+01	1.897E+01	6.222E-01	1.959E+01	2.806E-01	4.000E-07
3.918E+00	8.457E+01	6.181E+01	3.057E+00	6.487E+01	1.586E+00	7.000E-07
4.769E+00	8.972E+01	8.388E+01	8.730E+00	9.261E+01	2.834E+00	1.100E-06
5.911E+00	9.404E+01	1.400E+02	1.707E+01	1.571E+02	5.720E+00	1.600E-06
8.019E+00	9.782E+01	2.270E+02	3.026E+01	2.572E+02	1.30AE+01	2.500E-06
1.037E+01	9.929E+01	2.176E+02	4.124E+01	2.588E+02	8.358E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	4.665E+01	2.344E+02	1.105E+01	4.500E-06
1.630E+01	9.996E+01	1.691E+02	4.909E+01	2.182E+02	1.310E+01	6.000E-06
2.223E+01	1.000E+02	1.965E+02	4.593E+01	2.424E+02	1.505E+01	8.500E-06
3.146E+01	1.000E+02	2.398E+02	3.626E+01	2.691E+02	1.245E+01	1.250E-05
4.882E+01	1.000E+02	1.310E+02	2.199E+01	1.530E+02	1.013E+01	2.000E-05
6.630E+01	1.000E+02	6.505E+02	3.831E+01	6.888E+02	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 4

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.749E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.965E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 6.192E+00 UM OUTLET SIGMAP = 3.065E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.0728	0.0716	64.3675	2.164	35.6325	62.5998	2.062	37.4002
4.000E-07	1.530	0.253	0.6774	0.6523	56.7538	1.758	43.2462	55.5445	1.700	44.4555
7.000E-07	1.297	0.903	2.4961	2.4386	55.3530	1.691	44.6470	53.4378	1.603	46.5622
1.100E-06	1.188	0.815	2.1898	2.2305	56.6033	1.750	43.3967	52.8117	1.575	47.1883
1.600E-06	1.130	1.520	3.9380	4.0507	58.1548	1.827	41.8452	54.0517	1.630	45.9483
2.500E-06	1.083	3.524	8.7495	9.0233	59.8988	1.916	40.1012	55.8516	1.714	44.1484
3.500E-06	1.059	1.652	4.0669	4.3382	60.2386	1.934	39.7614	54.7223	1.661	45.2777
4.500E-06	1.046	1.652	4.1342	4.5714	59.5802	1.899	40.4198	52.2882	1.552	47.7118
6.000E-06	1.035	1.982	4.5999	5.1374	62.5155	2.057	37.4845	55.3085	1.689	44.6915
8.500E-06	1.024	3.304	7.2745	7.7914	64.4392	2.168	35.5608	59.3410	1.887	40.6590
1.250E-05	1.017	4.846	9.7411	9.9122	67.5336	2.359	32.4664	64.7330	2.185	35.2670
2.000E-05	1.010	12.115	13.0892	12.9019	82.5497	3.660	17.4503	81.6383	3.554	18.3617
2.750E-05	1.008	67.401	38.9707	36.8805	90.6614	4.971	9.3386	90.5656	4.950	9.4344

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.267E+01
CORRECTED SIGMAP OF EFFLUENT = 3.773E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,751E+00	8,686E-02	1,83AE+00	5,350E-02	2,000E-07
3,486E+00	8,104E+01	3,504E+01	9,798E-01	3,602E+01	2,806E-01	4,000E-07
3,918E+00	8,457E+01	1,122E+02	4,813E+00	1,170E+02	1,586E+00	7,000E-07
4,769E+00	8,972E+01	1,573E+02	1,375E+01	1,711E+02	2,834E+00	1,100E-06
5,911E+00	9,404E+01	2,742E+02	2,689E+01	3,011E+02	5,720E+00	1,600E-06
8,019E+00	9,782E+01	4,722E+02	4,766E+01	5,199E+02	1,30AE+01	2,500E-06
1,037E+01	9,929E+01	4,681E+02	6,494E+01	5,330E+02	8,35AE+00	3,500E-06
1,274E+01	9,97?E+01	4,072E+02	7,346E+01	4,807E+02	1,105E+01	4,500E-06
1,630E+01	9,996E+01	4,021E+02	7,731E+01	4,794E+02	1,310E+01	6,000E-06
2,223E+01	1,000E+02	5,045E+02	7,232E+01	5,768E+02	1,545E+01	8,500E-06
3,146E+01	1,000E+02	6,620E+02	5,710E+01	7,191E+02	1,245E+01	1,250E-05
4,882E+01	1,000E+02	6,632E+02	3,464E+01	6,978E+02	1,013E+01	2,000E-05
6,630E+01	1,000E+02	5,884E+03	6,033E+01	5,945E+03	5,918E+00	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 5

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.267E+01 UM OUTLET SIGMAP = 3.773E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.2008	97.6762	7.888	2.3238	97.4136	7.663	2.5864
4.000E-07	1.530	0.253	4.7115	3.0239	95.0987	6.323	4.9013	94.9190	6.247	5.0810
7.000E-07	1.297	0.903	17.8491	11.6553	94.7976	6.198	5.2024	94.5130	6.086	5.4870
1.100E-06	1.188	0.815	12.9822	9.117A	95.8076	6.650	4.1924	95.2441	6.386	4.7559
1.600E-06	1.130	1.520	18.0331	13.344A	96.8775	7.268	3.1225	96.2678	6.894	3.7322
2.500E-06	1.083	3.524	26.0236	21.0974	98.0564	8.262	1.9436	97.4550	7.697	2.5450
3.500E-06	1.059	1.652	8.3261	8.3404	98.6735	9.063	1.3265	97.8538	8.054	2.1462
4.500E-06	1.046	1.652	6.3882	8.1661	98.9823	9.619	1.0177	97.8986	8.099	2.1014
6.000E-06	1.035	1.982	3.0611	6.8884	99.5935	11.543	0.4065	98.5225	8.837	1.4775
8.500E-06	1.024	3.304	1.6599	6.9160	99.8678	13.89A	0.1322	99.1102	9.900	0.8898
1.250E-05	1.017	4.846	0.6293	5.133A	99.9658	16.735	0.0342	99.5496	11.328	0.4504
2.000E-05	1.010	12.115	0.0192	3.859A	99.9996	48.821	0.0004	99.8646	13.847	0.1354
2.750E-05	1.008	67.401	0.0254	2.2557	99.9999	66.304	0.0001	99.9858	18.572	0.0142

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.736A
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 2.956E+00
CORRECTED SIGMAP OF EFFLUENT = 2.606E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.142E-01	1.291E-02	1.271E-01	5.350E-02	2.000E-07
3.486E+00	8.104E+01	3.971E+00	1.456E-01	4.117E+00	2.806E-01	4.000E-07
3.918E+00	8.457E+01	1.308E+01	7.153E-01	1.379E+01	1.586E+00	7.000E-07
4.769E+00	8.972E+01	1.520E+01	2.043E+00	1.724E+01	2.834E+00	1.100E-06
5.911E+00	9.404E+01	2.046E+01	3.995E+00	2.446E+01	5.720E+00	1.600E-06
8.019E+00	9.782E+01	2.289E+01	7.083E+00	2.997E+01	1.304E+01	2.500E-06
1.037E+01	9.929E+01	1.562E+01	9.650E+00	2.527E+01	8.358E+00	3.500E-06
1.274E+01	9.977E+01	1.025E+01	1.092E+01	2.117E+01	1.105E+01	4.500E-06
1.630E+01	9.996E+01	4.360E+00	1.149E+01	1.585E+01	1.310E+01	6.000E-06
2.223E+01	1.000E+02	1.876E+00	1.075E+01	1.262E+01	1.545E+01	8.500E-06
3.146E+01	1.000E+02	6.968E-01	8.485E+00	9.182E+00	1.249E+01	1.250E-05
4.882E+01	1.000E+02	1.587E-02	5.147E+00	5.163E+00	1.013E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	8.965E+00	9.028E+00	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 6

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.749E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.956E+00 UM OUTLET SIGMAP = 2.606E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.1819	96.1885	6.850	3.8115	95.8051	6.649	4.1949
4.000E-07	1.530	0.253	3.4620	2.4751	92.8186	5.522	7.1814	92.5563	5.449	7.4437
7.000E-07	1.297	0.903	13.2808	9.6533	92.2814	5.371	7.7186	91.8660	5.261	8.1340
1.100E-06	1.188	0.815	10.3039	7.9879	93.3648	5.688	6.6352	92.5425	5.443	7.4575
1.600E-06	1.130	1.520	15.5806	12.5243	94.6205	6.128	5.3795	93.7305	5.807	6.2695
2.500E-06	1.083	3.524	25.9676	21.9763	96.1328	6.820	3.8672	95.2550	6.391	4.7450
3.500E-06	1.059	1.652	9.5269	9.1687	96.9735	7.334	3.0265	95.7771	6.635	4.2229
4.500E-06	1.046	1.653	8.2266	9.1080	97.3866	7.641	2.6134	95.8050	6.649	4.1950
6.000E-06	1.035	1.982	5.3236	7.7435	98.5904	8.936	1.4096	97.0273	7.371	2.9727
8.500E-06	1.024	3.304	4.5539	7.9425	99.2766	10.335	0.7234	98.1709	8.390	1.8291
1.250E-05	1.017	4.846	3.1180	6.0191	99.6623	11.932	0.3377	99.0549	9.774	0.9451
2.000E-05	1.010	12.115	0.3371	3.3799	99.9854	18.517	0.0146	99.7877	12.905	0.2123
2.750E-05	1.008	67.401	0.0794	1.8394	99.9994	66.304	0.0006	99.9792	17.779	0.0208

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.093E+00
CORRECTED SIGMAP OF EFFLUENT = 2.523E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	1.884E-02	2.061E-01	5.350E-02	2.000E-07
3.486E+00	8.104E+01	5.819E+00	2.125E-01	6.031E+00	2.806E-01	4.000E-07
3.918E+00	8.457E+01	1.940E+01	1.044E+00	2.044E+01	1.584E+00	7.000E-07
4.769E+00	8.972E+01	2.406E+01	2.982E+00	2.704E+01	2.834E+00	1.100E-06
5.911E+00	9.404E+01	3.525E+01	5.831E+00	4.108E+01	5.720E+00	1.600E-06
8.019E+00	9.782E+01	4.554E+01	1.034E+01	5.588E+01	1.308E+01	2.500E-06
1.037E+01	9.929E+01	3.563E+01	1.408E+01	4.971E+01	8.358E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	1.593E+01	4.226E+01	1.105E+01	4.500E-06
1.630E+01	9.996E+01	1.512E+01	1.677E+01	3.189E+01	1.310E+01	6.000E-06
2.223E+01	1.000E+02	1.026E+01	1.569E+01	2.595E+01	1.545E+01	8.500E-06
3.146E+01	1.000E+02	6.885E+00	1.238E+01	1.927E+01	1.245E+01	1.250E-05
4.882E+01	1.000E+02	5.550E-01	7.512E+00	8.067E+00	1.013E+01	2.000E-05
6.630E+01	1.000E+02	3.894E-01	1.308E+01	1.347E+01	5.918E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 7

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.093E+00 UM OUTLET SIGMAP = 2.523E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40
RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.1707	94.3710	6.033	5.6290	93.8676	5.853	6.1324
4.000E-07	1.530	0.253	2.8175	2.1530	90.2545	4.882	9.7455	89.9101	4.809	10.0899
7.000E-07	1.297	0.903	10.8492	8.4231	89.4860	4.723	10.5140	88.9405	4.617	11.0595
1.100E-06	1.188	0.815	8.7455	7.1972	90.6096	4.960	9.3904	89.5297	4.731	10.4703
1.600E-06	1.130	1.520	13.8731	11.7377	92.0129	5.299	7.9871	90.8443	5.013	9.1557
2.500E-06	1.083	3.524	24.9052	21.8081	93.8154	5.835	6.1846	92.6627	5.477	7.3373
3.500E-06	1.059	1.652	9.7131	9.3580	94.8548	6.221	5.1452	93.2838	5.662	6.7162
4.500E-06	1.046	1.652	8.7730	9.3689	95.3527	6.434	4.6473	93.2760	5.660	6.7240
6.000E-06	1.035	1.982	6.4826	8.2158	97.1378	7.451	2.8622	95.0853	6.317	4.9147
8.500E-06	1.024	3.304	6.5732	8.8977	98.2590	8.493	1.7410	96.8071	7.221	3.1929
1.250E-05	1.017	4.846	5.5095	7.3265	99.0051	9.666	0.9949	98.2075	8.432	1.7925
2.000E-05	1.010	12.115	1.0816	3.4506	99.9219	15.001	0.0781	99.6623	11.932	0.3377
2.750E-05	1.008	67.401	0.4642	1.8927	99.9940	20.373	0.0060	99.9667	16.789	0.0333

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 3.279E+00
CORRECTED SIGMAP OF EFFLUENT = 2.514E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	2,766E-01	2,474E-02	3,014E-01	5,350E-02	2,000E-07
3,486E+00	8,104E+01	7,896E+00	2,790E-01	8,175E+00	2,806E-01	4,000E-07
3,918E+00	8,457E+01	2,642E+01	1,371E+00	2,780E+01	1,586E+00	7,000E-07
4,769E+00	8,972E+01	3,405E+01	3,915E+00	3,796E+01	2,834E+00	1,100E-06
5,911E+00	9,404E+01	5,234E+01	7,657E+00	5,999E+01	5,720E+00	1,600E-06
8,019E+00	9,782E+01	7,283E+01	1,357E+01	8,641E+01	1,308E+01	2,500E-06
1,037E+01	9,929E+01	6,057E+01	1,849E+01	7,906E+01	8,358E+00	3,500E-06
1,274E+01	9,977E+01	4,682E+01	2,092E+01	6,774E+01	1,105E+01	4,500E-06
1,630E+01	9,996E+01	3,070E+01	2,202E+01	5,272E+01	1,310E+01	6,000E-06
2,223E+01	1,000E+02	2,470E+01	2,060E+01	4,530E+01	1,545E+01	8,500E-06
3,146E+01	1,000E+02	2,029E+01	1,626E+01	3,655E+01	1,245E+01	1,250E-05
4,882E+01	1,000E+02	2,969E+00	9,865E+00	1,283E+01	1,013E+01	2,000E-05
6,630E+01	1,000E+02	3,798E+00	1,718E+01	2,098E+01	5,918E+00	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 8

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.279E+00 UM OUTLET SIGMAP = 2.514E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.1607	91.8187	5.249	8.1813	91.1735	5.090	8.8265
4.000E-07	1.530	0.253	2.3418	1.8893	86.9043	4.262	13.0957	86.4629	4.193	13.5371
7.000E-07	1.297	0.903	9.0162	7.3850	85.8735	4.103	14.1265	85.1745	4.002	14.8255
1.100E-06	1.188	0.815	7.4873	6.4657	87.0024	4.278	12.9976	85.6185	4.066	14.3815
1.600E-06	1.130	1.520	12.3234	10.8737	88.5295	4.540	11.4705	87.0318	4.283	12.9682
2.500E-06	1.083	3.524	23.3765	21.1161	90.6149	4.961	9.3851	89.1377	4.654	10.8623
3.500E-06	1.059	1.652	9.5059	9.2538	91.8589	5.259	8.1411	89.8455	4.796	10.1545
4.500E-06	1.046	1.652	8.8244	9.3126	92.4426	5.415	7.5574	89.7811	4.782	10.2189
6.000E-06	1.035	1.982	7.1634	8.4668	94.8866	6.234	5.1134	92.2561	5.364	7.7439
8.500E-06	1.024	3.304	8.1009	9.7140	96.5311	7.048	3.4689	94.6703	6.147	5.3297
1.250E-05	1.017	4.846	7.6993	8.7415	97.7522	7.957	2.2478	96.7300	7.171	3.2700
2.000E-05	1.010	12.115	2.3700	4.0729	99.7232	12.349	0.2768	99.3906	10.694	0.6094
2.750E-05	1.008	67.401	1.6000	2.5480	99.9664	16.771	0.0336	99.9315	15.276	0.0685

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.92A

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 3.573E+00
CORRECTED SIGMAP OF EFFLUENT = 2.560E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	4,020E-01	3,170E-02	4,337E-01	5,350E-02	2,000E-07
3,486E+00	8,104E+01	1,061E+01	3,576E-01	1,097E+01	2,806E-01	4,000E-07
3,918E+00	8,457E+01	3,550E+01	1,757E+00	3,726E+01	1,586E+00	7,000E-07
4,769E+00	8,972E+01	4,713E+01	5,018E+00	5,214E+01	2,834E+00	1,100E-06
5,911E+00	9,404E+01	7,516E+01	9,813E+00	8,498E+01	5,720E+00	1,600E-06
8,019E+00	9,782E+01	1,105E+02	1,740E+01	1,279E+02	1,308E+01	2,500E-06
1,037E+01	9,929E+01	9,584E+01	2,370E+01	1,195E+02	8,358E+00	3,500E-06
1,274E+01	9,977E+01	7,614E+01	2,681E+01	1,029E+02	1,105E+01	4,500E-06
1,630E+01	9,996E+01	5,485E+01	2,822E+01	8,307E+01	1,310E+01	6,000E-06
2,223E+01	1,000E+02	4,921E+01	2,640E+01	7,561E+01	1,545E+01	8,500E-06
3,146E+01	1,000E+02	4,543E+01	2,084E+01	6,667E+01	1,245E+01	1,250E-05
4,882E+01	1,000E+02	1,052E+01	1,264E+01	2,316E+01	1,013E+01	2,000E-05
6,630E+01	1,000E+02	2,116E+01	2,202E+01	4,318E+01	5,918E+00	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 9

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.573E+00 UM OUTLET SIGMAP = 2.560E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.3449	1.0551	98.7634	9.210	1.2366	92.9135	5.550	7.0865
4.000E-07	1.530	0.253	6.403A	5.5619	97.0053	7.356	2.9947	95.1275	6.335	4.8725
7.000E-07	1.297	0.903	24.0564	18.7484	96.8480	7.249	3.1520	95.3981	6.455	4.6019
1.100E-06	1.188	0.815	16.2242	14.6035	97.6447	7.859	2.3553	96.0285	6.764	3.9715
1.600E-06	1.130	1.520	20.1366	18.1465	98.4326	8.713	1.5674	97.3539	7.615	2.6461
2.500E-06	1.083	3.524	23.1421	21.9693	99.2230	10.185	0.7770	98.6182	8.978	1.3818
3.500E-06	1.059	1.652	5.6379	6.8900	99.5962	11.557	0.4038	99.0756	9.820	0.9244
4.500E-06	1.046	1.652	3.2086	5.4251	99.7702	12.739	0.2298	99.2721	10.322	0.7279
6.000E-06	1.035	1.982	0.7054	3.4193	99.9579	16.297	0.0421	99.6176	11.671	0.3824
8.500E-06	1.024	3.304	0.0695	2.3550	99.9975	22.227	0.0025	99.8420	13.525	0.1580
1.250E-05	1.017	4.846	0.0041	1.1384	99.9999	31.459	0.0001	99.9479	15.852	0.0521
2.000E-05	1.010	12.115	0.0102	0.5281	99.9999	48.821	0.0001	99.9903	19.384	0.0097
2.750E-05	1.008	67.401	0.0565	0.1595	99.9999	66.304	0.0001	099.9995	66.304	0.0005

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 1.666E+00
CORRECTED SIGMAP OF EFFLUENT = 2.227E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	6.077E-02	2.875E-01	3.482E-01	1.867E+00	2.000E-07
3.486E+00	8.104E+01	2.426E+00	1.521E+00	3.948E+00	4.594E+00	4.000E-07
3.918E+00	8.457E+01	7.922E+00	3.644E+00	1.157E+01	1.266E+01	7.000E-07
4.769E+00	8.972E+01	8.540E+00	5.860E+00	1.440E+01	1.274E+01	1.100E-06
5.911E+00	9.404E+01	1.027E+01	7.068E+00	1.734E+01	1.586E+01	1.600E-06
8.019E+00	9.782E+01	9.150E+00	7.122E+00	1.627E+01	2.061E+01	2.500E-06
1.037E+01	9.929E+01	4.753E+00	6.129E+00	1.088E+01	8.317E+00	3.500E-06
1.274E+01	9.977E+01	2.315E+00	5.018E+00	7.333E+00	7.957E+00	4.500E-06
1.630E+01	9.996E+01	4.517E-01	3.650E+00	4.102E+00	6.522E+00	6.000E-06
2.223E+01	1.000E+02	3.531E-02	2.206E+00	2.241E+00	4.968E+00	8.500E-06
3.146E+01	1.000E+02	2.022E-03	1.061E+00	1.063E+00	2.439E+00	1.250E-05
4.882E+01	1.000E+02	3.769E-03	3.672E-01	3.709E-01	1.132E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	3.310E-01	3.935E-01	3.424E-01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 10

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 1.666E+00 UM OUTLET SIGMAP = 2.227E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.2645	0.8224	97.1023	7.425	2.8977	86.1807	4.150	13.8193
4.000E-07	1.530	0.253	4.0629	4.2484	94.1940	5.968	5.8060	90.6882	4.977	9.3118
7.000E-07	1.297	0.903	15.5003	14.5135	93.7940	5.828	6.2060	91.0871	5.069	8.9129
1.100E-06	1.188	0.815	11.6397	12.0233	94.8365	6.214	5.1635	91.8191	5.249	8.1809
1.600E-06	1.130	1.520	16.8762	16.5227	95.9859	6.742	4.0141	93.9720	5.889	6.0280
2.500E-06	1.083	3.524	26.2590	24.2954	97.3060	7.578	2.6940	96.1768	6.844	3.8232
3.500E-06	1.059	1.652	9.0557	8.7996	98.0181	8.221	1.9819	97.0462	7.385	2.9538
4.500E-06	1.046	1.652	7.4341	7.6170	98.3730	8.635	1.6270	97.4431	7.687	2.5569
6.000E-06	1.035	1.982	4.2085	5.0143	99.2323	10.210	0.7677	98.5970	8.946	1.4030
8.500E-06	1.024	3.304	2.9758	3.6697	99.6744	12.008	0.3256	99.3841	10.672	0.6159
1.250E-05	1.017	4.846	1.6067	1.8965	99.8801	14.103	0.1199	99.7830	12.859	0.2170
2.000E-05	1.010	12.115	0.0981	0.4580	99.9971	21.887	0.0029	99.9790	17.759	0.0210
2.750E-05	1.008	67.401	0.0185	0.1192	99.9999	66.304	0.0001	99.9990	66.304	0.0010

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 1.940E+00
CORRECTED SIGMAP OF EFFLUENT = 2.254E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	5.367E-01	6.791E-01	1.867E+00	2.000E-07
3.486E+00	8.104E+01	4.704E+00	2.841E+00	7.545E+00	4.594E+00	4.000E-07
3.918E+00	8.457E+01	1.560E+01	6.803E+00	2.240E+01	1.266E+01	7.000E-07
4.769E+00	8.972E+01	1.872E+01	1.094E+01	2.966E+01	1.274E+01	1.100E-06
5.911E+00	9.404E+01	2.630E+01	1.320E+01	3.950E+01	1.586E+01	1.600E-06
8.019E+00	9.782E+01	3.173E+01	1.330E+01	4.502E+01	2.061E+01	2.500E-06
1.037E+01	9.929E+01	2.333E+01	1.144E+01	3.477E+01	8.317E+00	3.500E-06
1.274E+01	9.977E+01	1.639E+01	9.368E+00	2.576E+01	7.957E+00	4.500E-06
1.630E+01	9.996E+01	8.235E+00	6.814E+00	1.505E+01	6.522E+00	6.000E-06
2.223E+01	1.000E+02	4.619E+00	4.118E+00	8.738E+00	4.968E+00	8.500E-06
3.146E+01	1.000E+02	2.444E+00	1.981E+00	4.425E+00	2.439E+00	1.250E-05
4.882E+01	1.000E+02	1.113E-01	6.855E-01	7.968E-01	1.132E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	6.180E-01	6.805E-01	3.424E-01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 11

ESP PERFORMANCE: EFFICIENCY = 99.0455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.940E+00 UM OUTLET SIGMAP = 2.254E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.5649	92.7505	5.502	7.2495	71.1598	2.607	28.8402
4.000E-07	1.530	0.253	2.3354	2.8471	87.9714	4.441	12.0286	81.0409	3.487	18.9591
7.000E-07	1.297	0.903	8.8651	9.7250	87.2072	4.311	12.7928	81.8561	3.579	18.1439
1.100E-06	1.188	0.815	7.1634	8.4262	88.5468	4.543	11.4532	82.5818	3.664	17.4182
1.600E-06	1.130	1.520	11.5362	12.5146	90.1102	4.851	9.8898	86.1291	4.142	13.8709
2.500E-06	1.083	3.524	21.6945	21.4488	91.9780	5.290	8.0220	89.7459	4.775	10.2541
3.500E-06	1.059	1.652	9.0002	8.8454	92.9008	5.546	7.0992	90.9793	5.044	9.0207
4.500E-06	1.046	1.652	8.6513	8.4939	93.1761	5.629	6.8239	91.3378	5.129	8.6622
6.000E-06	1.035	1.982	7.3927	7.1953	95.1397	6.341	4.8603	93.8839	5.859	6.1161
8.500E-06	1.024	3.304	9.1127	8.1737	96.4060	6.973	3.5940	95.8322	6.663	4.1678
1.250E-05	1.017	4.846	9.0758	7.5721	97.5596	7.785	2.4404	97.3675	7.626	2.6325
2.000E-05	1.010	12.115	2.9234	2.5176	99.6856	12.081	0.3144	99.6499	11.856	0.3501
2.750E-05	1.008	67.401	2.0658	1.6753	99.9601	16.408	0.0399	99.9581	16.308	0.0419

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 2.924E+00
CORRECTED SIGMAP OF EFFLUENT = 2.632E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	3,562E-01	1,061E+00	1,417E+00	1,867E+00	2,000E-07
3,486E+00	8,104E+01	9,746E+00	5,615E+00	1,536E+01	4,594E+00	4,000E-07
3,918E+00	8,457E+01	3,215E+01	1,345E+01	4,560E+01	1,266E+01	7,000E-07
4,769E+00	8,972E+01	4,153E+01	2,163E+01	6,315E+01	1,274E+01	1,100E-06
5,911E+00	9,404E+01	6,480E+01	2,609E+01	9,089E+01	1,586E+01	1,600E-06
8,019E+00	9,782E+01	9,447E+01	2,629E+01	1,208E+02	2,061E+01	2,500E-06
1,037E+01	9,929E+01	8,357E+01	2,262E+01	1,062E+02	8,317E+00	3,500E-06
1,274E+01	9,977E+01	6,875E+01	1,852E+01	8,727E+01	7,957E+00	4,500E-06
1,630E+01	9,996E+01	5,213E+01	1,347E+01	6,561E+01	6,522E+00	6,000E-06
2,223E+01	1,000E+02	5,098E+01	8,141E+00	5,913E+01	4,968E+00	8,500E-06
3,146E+01	1,000E+02	4,976E+01	3,916E+00	5,367E+01	2,439E+00	1,250E-05
4,882E+01	1,000E+02	1,195E+01	1,355E+00	1,331E+01	1,132E+00	2,000E-05
6,630E+01	1,000E+02	2,517E+01	1,222E+00	2,639E+01	3,424E-01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 12

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.924E+00 UM OUTLET SIGMAP = 2.632E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.3528	83.3481	3.759	16.6519	44.1802	1.222	55.8198
4.000E-07	1.530	0.253	1.3078	1.7435	76.5857	3.044	23.4143	64.0130	2.143	35.9870
7.000E-07	1.297	0.903	4.9032	5.9317	75.4048	2.941	24.5952	65.6972	2.243	34.3028
1.100E-06	1.188	0.815	4.1624	5.2994	76.8663	3.069	23.1337	66.0452	2.265	33.9548
1.600E-06	1.130	1.520	7.1693	8.3209	78.6357	3.236	21.3643	71.4135	2.626	28.5865
2.500E-06	1.083	3.524	14.9949	15.7394	80.7263	3.452	19.2737	76.6769	3.052	23.3231
3.500E-06	1.059	1.652	6.7415	6.9504	81.5156	3.540	18.4844	78.0298	3.177	21.9702
4.500E-06	1.046	1.652	6.7972	6.9509	81.3630	3.522	18.6370	78.0282	3.177	21.9718
6.000E-06	1.035	1.982	6.8997	6.8495	84.2318	3.873	15.7682	81.9535	3.590	18.0465
8.500E-06	1.024	3.304	10.1042	9.4232	86.1477	4.145	13.8523	85.1066	3.993	14.8934
1.250E-05	1.017	4.846	12.2164	10.9199	88.5813	4.550	11.4187	88.2329	4.487	11.7671
2.000E-05	1.010	12.115	9.2214	8.1488	96.5523	7.061	3.4477	96.4876	7.022	3.5124
2.750E-05	1.008	67.401	15.3608	13.3695	98.9677	9.589	1.0323	98.9642	9.582	1.0358

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 98.7780
CORRECTED MMD OF EFFLUENT = 5.400E+00
CORRECTED SIGMAP OF EFFLUENT = 3.300E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E-01	1.925E+00	2.743E+00	1.867E+00	2.000E-07
3.486E+00	8.104E+01	1.897E+01	1.019E+01	2.916E+01	4.594E+00	4.000E-07
3.918E+00	8.457E+01	6.181E+01	2.440E+01	8.621E+01	1.266E+01	7.000E-07
4.769E+00	8.972E+01	8.388E+01	3.924E+01	1.231E+02	1.274E+01	1.100E-06
5.911E+00	9.404E+01	1.400E+02	4.732E+01	1.873E+02	1.586E+01	1.600E-06
8.019E+00	9.782E+01	2.270E+02	4.769E+01	2.747E+02	2.061E+01	2.500E-06
1.037E+01	9.929E+01	2.176E+02	4.104E+01	2.586E+02	8.317E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	3.360E+01	2.214E+02	7.957E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	2.444E+01	1.936E+02	6.522E+00	6.000E-06
2.223E+01	1.000E+02	1.965E+02	1.477E+01	2.113E+02	4.968E+00	8.500E-06
3.146E+01	1.000E+02	2.328E+02	7.104E+00	2.399E+02	2.439E+00	1.250E-05
4.862E+01	1.000E+02	1.310E+02	2.458E+00	1.335E+02	1.132E+00	2.000E-05
6.630E+01	1.000E+02	6.505E+02	2.216E+00	6.527E+02	3.424E-01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 13

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 5.400E+00 UM OUTLET SIGMAP = 3.300E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.0728	0.1863	64.3675	2.164	35.6325	2.6853	0.057	97.3147
4.000E-07	1.530	0.253	0.6774	0.9251	56.7538	1.758	43.2462	36.9540	0.967	63.0460
7.000E-07	1.297	0.903	2.4961	3.1389	55.3530	1.691	44.6470	40.0654	1.073	59.9346
1.100E-06	1.188	0.815	2.1498	2.8568	56.6033	1.750	43.3967	39.5620	1.056	60.4380
1.600E-06	1.130	1.520	3.9380	4.6916	58.1548	1.827	41.8452	46.7812	1.323	53.2188
2.500E-06	1.083	3.524	8.7495	9.4995	59.8988	1.916	40.1012	53.5218	1.606	46.4782
3.500E-06	1.059	1.652	4.0669	4.3357	60.2386	1.934	39.7614	54.7490	1.663	45.2510
4.500E-06	1.046	1.652	4.1342	4.3759	59.5802	1.899	40.4198	54.3285	1.643	45.6715
6.000E-06	1.035	1.982	4.5999	4.7214	62.5155	2.057	37.4845	58.9277	1.866	41.0723
8.500E-06	1.024	3.304	7.2745	7.1286	64.4392	2.168	35.5608	62.7996	2.073	37.2004
1.250E-05	1.017	4.846	9.7411	9.2792	67.5336	2.359	32.4664	66.9849	2.324	33.0151
2.000E-05	1.010	12.115	13.0892	12.3331	82.5497	3.660	17.4503	82.4478	3.648	17.5522
2.750E-05	1.008	67.401	38.9707	36.5278	90.6614	4.971	9.3386	90.6558	4.970	9.3442

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.215E+01
CORRECTED SIGMAP OF EFFLUENT = 4.163E+00
LOG-NORMAL GOODNESS OF FIT = 0.989
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	3.031E+00	4.782E+00	1.867E+00	2.000E-07
3.486E+00	8.104E+01	3.504E+01	1.604E+01	5.108E+01	4.594E+00	4.000E-07
3.918E+00	8.457E+01	1.122E+02	3.842E+01	1.506E+02	1.266E+01	7.000E-07
4.769E+00	8.972E+01	1.573E+02	6.179E+01	2.191E+02	1.274E+01	1.100E-06
5.911E+00	9.404E+01	2.742E+02	7.453E+01	3.487E+02	1.586E+01	1.600E-06
8.019E+00	9.782E+01	4.722E+02	7.510E+01	5.473E+02	2.061E+01	2.500E-06
1.037E+01	9.929E+01	4.841E+02	6.462E+01	5.327E+02	8.317E+00	3.500E-06
1.274E+01	9.977E+01	4.072E+02	5.291E+01	4.601E+02	7.957E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	3.848E+01	4.406E+02	6.522E+00	6.000E-06
2.223E+01	1.000E+02	5.045E+02	2.326E+01	5.277E+02	4.968E+00	8.500E-06
3.146E+01	1.000E+02	6.620E+02	1.119E+01	6.731E+02	2.439E+00	1.250E-05
4.882E+01	1.000E+02	6.632E+02	3.872E+00	6.671E+02	1.132E+00	2.000E-05
6.630E+01	1.000E+02	5.884E+03	3.490E+00	5.888E+03	3.424E-01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 14

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 1.215E+01 UM OUTLET SIGMAP = 4.163E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.8919	97.6762	7.888	2.3238	88.5100	4.537	11.4900
4.000E-07	1.530	0.253	4.7115	4.6681	95.0987	6.323	4.9013	92.1564	5.337	7.8436
7.000E-07	1.297	0.903	17.8491	15.8764	94.7976	6.198	5.2024	92.5258	5.438	7.4742
1.100E-06	1.188	0.815	12.9822	12.8926	95.8076	6.650	4.1924	93.2752	5.660	6.7248
1.600E-06	1.130	1.520	18.0331	17.2079	96.8775	7.268	3.1225	95.1874	6.361	4.8126
2.500E-06	1.083	3.524	26.0236	23.9673	98.0564	8.262	1.9436	97.1088	7.430	2.8912
3.500E-06	1.059	1.652	8.3261	8.3250	98.6735	9.063	1.3265	97.8577	8.058	2.1423
4.500E-06	1.046	1.652	6.3882	6.9878	98.9823	9.619	1.0177	98.2018	8.425	1.7982
6.000E-06	1.035	1.982	3.0611	4.3809	99.5935	11.543	0.4065	99.0604	9.786	0.9396
8.500E-06	1.024	3.304	1.6599	2.9213	99.8678	13.898	0.1322	99.6241	11.707	0.3759
1.250E-05	1.017	4.846	0.6293	1.3190	99.9658	16.735	0.0342	99.8843	14.177	0.1157
2.000E-05	1.010	12.115	0.0192	0.4314	99.9996	48.821	0.0004	99.9849	18.442	0.0151
2.750E-05	1.008	67.401	0.0254	0.1303	99.9999	66.304	0.0001	99.9992	66.304	0.0008

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 1.816E+00
CORRECTED SIGMAP OF EFFLUENT = 2.216E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,142E-01	4,504E-01	5,646E-01	1,867E+00	2,000E-07
3,486E+00	8,104E+01	3,971E+00	2,384E+00	6,355E+00	4,594E+00	4,000E-07
3,918E+00	8,457E+01	1,308E+01	5,710E+00	1,878E+01	1,266E+01	7,000E-07
4,769E+00	8,972E+01	1,520E+01	9,182E+00	2,438E+01	1,274E+01	1,100E-06
5,911E+00	9,404E+01	2,046E+01	1,107E+01	3,154E+01	1,586E+01	1,600E-06
8,019E+00	9,782E+01	2,289E+01	1,116E+01	3,405E+01	2,061E+01	2,500E-06
1,037E+01	9,929E+01	1,562E+01	9,603E+00	2,522E+01	8,317E+00	3,500E-06
1,274E+01	9,977E+01	1,025E+01	7,862E+00	1,812E+01	7,957E+00	4,500E-06
1,630E+01	9,996E+01	4,360E+00	5,719E+00	1,008E+01	6,522E+00	6,000E-06
2,223E+01	1,000E+02	1,876E+00	3,456E+00	5,332E+00	4,968E+00	8,500E-06
3,146E+01	1,000E+02	6,968E-01	1,662E+00	2,359E+00	2,439E+00	1,250E-05
4,882E+01	1,000E+02	1,587E-02	5,753E-01	5,912E-01	1,132E+00	2,000E-05
6,630E+01	1,000E+02	6,250E-02	5,186E-01	5,811E-01	3,424E-01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 15

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 1.816E+00 UM OUTLET SIGMAP = 2.216E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.7455	96.1885	6.850	3.8115	82.8104	3.692	17.1896
4.000E-07	1.530	0.253	3.4620	3.8158	92.8186	5.522	7.1814	88.5243	4.539	11.4757
7.000E-07	1.297	0.903	13.2808	13.0953	92.2814	5.371	7.7186	88.9657	4.621	11.0343
1.100E-06	1.188	0.815	10.3039	11.0660	93.3648	5.688	6.6352	89.6688	4.759	10.3312
1.600E-06	1.130	1.520	15.5806	15.6744	94.6205	6.128	5.3795	92.1537	5.336	7.8463
2.500E-06	1.083	3.524	25.9676	24.3166	96.1328	6.820	3.8672	94.7497	6.179	5.2503
3.500E-06	1.059	1.652	9.5269	9.1561	96.9735	7.334	3.0265	95.7828	6.638	4.2172
4.500E-06	1.046	1.652	8.2266	8.1472	97.3866	7.641	2.6134	96.2475	6.883	3.7525
6.000E-06	1.035	1.982	5.3236	5.6988	98.5904	8.936	1.4096	97.8122	8.014	2.1878
8.500E-06	1.024	3.304	4.5539	4.6851	99.2766	10.335	0.7234	98.9211	9.496	1.0789
1.250E-05	1.017	4.846	3.1180	2.9085	99.6623	11.932	0.3377	99.5433	11.299	0.4567
2.000E-05	1.010	12.115	0.3371	0.5843	99.9854	18.517	0.0146	99.9633	16.585	0.0367
2.750E-05	1.008	67.401	0.0794	0.1064	99.9994	66.304	0.0006	99.9988	23.754	0.0012

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 2.109E+00
CORRECTED SIGMAP OF EFFLUENT = 2.311E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,873E-01	6,574E-01	8,447E-01	1,867E+00	2,000E-07
3,486E+00	8,104E+01	5,819E+00	3,479E+00	9,298E+00	4,594E+00	4,000E-07
3,918E+00	8,457E+01	1,940E+01	8,333E+00	2,773E+01	1,266E+01	7,000E-07
4,769E+00	8,972E+01	2,406E+01	1,340E+01	3,746E+01	1,274E+01	1,100E-06
5,911E+00	9,404E+01	3,525E+01	1,616E+01	5,141E+01	1,586E+01	1,600E-06
8,019E+00	9,782E+01	4,554E+01	1,629E+01	6,183E+01	2,061E+01	2,500E-06
1,037E+01	9,929E+01	3,563E+01	1,402E+01	4,965E+01	8,317E+00	3,500E-06
1,274E+01	9,977E+01	2,633E+01	1,147E+01	3,780E+01	7,957E+00	4,500E-06
1,630E+01	9,996E+01	1,512E+01	8,347E+00	2,347E+01	6,522E+00	6,000E-06
2,223E+01	1,000E+02	1,026E+01	5,044E+00	1,531E+01	4,968E+00	8,500E-06
3,146E+01	1,000E+02	6,885E+00	2,426E+00	9,311E+00	2,439E+00	1,250E-05
4,882E+01	1,000E+02	5,550E-01	8,397E-01	1,395E+00	1,132E+00	2,000E-05
6,630E+01	1,000E+02	3,894E-01	7,570E-01	1,146E+00	3,424E-01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 16

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.109E+00 UM OUTLET SIGMAP = 2.311E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40

RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.6456	94.3710	6.033	5.6290	76.8040	3.064	23.1960
4.000E-07	1.530	0.253	2.8175	3.2828	90.2545	4.882	9.7455	84.6156	3.925	15.3844
7.000E-07	1.297	0.903	10.8492	11.3236	89.4860	4.723	10.5140	85.1321	3.996	14.8679
1.100E-06	1.188	0.815	8.7455	9.7910	90.6096	4.960	9.3904	85.7563	4.086	14.2437
1.600E-06	1.130	1.520	13.8731	14.3922	92.0129	5.299	7.9871	88.7737	4.585	11.2263
2.500E-06	1.083	3.524	24.9052	23.7402	93.8154	5.835	6.1846	91.9992	5.295	8.0008
3.500E-06	1.059	1.652	9.7131	9.3474	94.8548	6.221	5.1452	93.2914	5.665	6.7086
4.500E-06	1.046	1.652	8.7730	8.5592	95.3527	6.434	4.6473	93.8570	5.849	6.1430
6.000E-06	1.035	1.982	6.4826	6.4928	97.1378	7.451	2.8622	96.1160	6.811	3.8840
8.500E-06	1.024	3.304	6.5732	6.1528	98.2590	8.493	1.7410	97.7921	7.995	2.2079
1.250E-05	1.017	4.846	5.5095	4.7052	99.0051	9.666	0.9949	98.8488	9.360	1.1512
2.000E-05	1.010	12.115	1.0816	1.0948	99.9219	15.001	0.0781	99.8929	14.339	0.1071
2.750E-05	1.008	67.401	0.4642	0.4323	99.9940	20.373	0.0060	99.9924	19.885	0.0076

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 2.386E+00
CORRECTED SIGMAP OF EFFLUENT = 2.393E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	2,766E-01	8,632E-01	1,140E+00	1,867E+00	2,000E-07
3,486E+00	8,104E+01	7,896E+00	4,569E+00	1,247E+01	4,594E+00	4,000E-07
3,918E+00	8,457E+01	2,642E+01	1,094E+01	3,737E+01	1,266E+01	7,000E-07
4,769E+00	8,972E+01	3,405E+01	1,760E+01	5,164E+01	1,274E+01	1,100E-06
5,911E+00	9,404E+01	5,234E+01	2,122E+01	7,356E+01	1,586E+01	1,600E-06
8,019E+00	9,782E+01	7,283E+01	2,139E+01	9,422E+01	2,061E+01	2,300E-06
1,037E+01	9,929E+01	6,057E+01	1,840E+01	7,898E+01	8,317E+00	3,500E-06
1,274E+01	9,977E+01	4,682E+01	1,507E+01	6,189E+01	7,957E+00	4,500E-06
1,630E+01	9,996E+01	3,070E+01	1,096E+01	4,166E+01	6,522E+00	6,000E-06
2,223E+01	1,000E+02	2,470E+01	6,624E+00	3,132E+01	4,968E+00	8,500E-06
3,146E+01	1,000E+02	2,029E+01	3,186E+00	2,347E+01	2,439E+00	1,250E-05
4,882E+01	1,000E+02	2,969E+00	1,103E+00	4,072E+00	1,132E+00	2,000E-05
6,630E+01	1,000E+02	3,798E+00	9,940E-01	4,792E+00	3,424E-01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 17

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 2.386E+00 UM OUTLET SIGMAP = 2.393E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60
RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.5588	91.8187	5.249	8.1813	69.3051	2.476	30.6949
4.000E-07	1.530	0.253	2.3418	2.8363	86.9043	4.262	13.0957	79.6775	3.341	20.3225
7.000E-07	1.297	0.903	9.0162	9.8163	85.8735	4.103	14.1265	80.2936	3.405	19.7064
1.100E-06	1.188	0.815	7.4873	8.6399	87.0024	4.278	12.9976	80.7824	3.458	19.2176
1.600E-06	1.130	1.520	12.3234	13.0987	88.5295	4.540	11.4705	84.3782	3.892	15.6218
2.500E-06	1.083	3.524	23.3765	22.7691	90.6149	4.961	9.3851	88.2873	4.496	11.7127
3.500E-06	1.059	1.652	9.5059	9.2449	91.8589	5.259	8.1411	89.8553	4.798	10.1447
4.500E-06	1.046	1.652	8.8244	8.6339	92.4426	5.415	7.5574	90.5258	4.941	9.4742
6.000E-06	1.035	1.982	7.1634	7.0225	94.8866	6.234	5.1134	93.5771	5.756	6.4229
8.500E-06	1.024	3.304	8.1009	7.4131	96.5311	7.048	3.4689	95.9327	6.714	4.0673
1.250E-05	1.017	4.846	7.6993	6.5443	97.7522	7.957	2.2478	97.5519	7.778	2.4481
2.000E-05	1.010	12.115	2.3700	2.0982	99.7232	12.349	0.2768	99.6860	12.085	0.3140
2.750E-05	1.008	67.401	1.6000	1.3239	99.9664	16.771	0.0336	99.9644	16.649	0.0356

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 2.00
RSIGMA = 2.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 2.787E+00
CORRECTED SIGMAP OF EFFLUENT = 2.563E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	1.106E+00	1.508E+00	1.867E+00	2.000E-07
3.486E+00	8.104E+01	1.061E+01	5.855E+00	1.647E+01	4.594E+00	4.000E-07
3.918E+00	8.457E+01	3.550E+01	1.402E+01	4.953E+01	1.266E+01	7.000E-07
4.769E+00	8.972E+01	4.713E+01	2.255E+01	6.968E+01	1.274E+01	1.100E-06
5.911E+00	9.404E+01	7.516E+01	2.720E+01	1.024E+02	1.586E+01	1.600E-06
8.019E+00	9.782E+01	1.105E+02	2.741E+01	1.379E+02	2.061E+01	2.500E-06
1.037E+01	9.929E+01	9.584E+01	2.359E+01	1.194E+02	8.317E+00	3.500E-06
1.274E+01	9.977E+01	7.614E+01	1.931E+01	9.545E+01	7.957E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	1.405E+01	6.890E+01	6.522E+00	6.000E-06
2.223E+01	1.000E+02	4.921E+01	8.489E+00	5.770E+01	4.968E+00	8.500E-06
3.146E+01	1.000E+02	4.583E+01	4.083E+00	4.991E+01	2.439E+00	1.250E-05
4.882E+01	1.000E+02	1.052E+01	1.413E+00	1.193E+01	1.132E+00	2.000E-05
6.630E+01	1.000E+02	2.116E+01	1.274E+00	2.244E+01	3.424E-01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 18

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 2.787E+00 UM OUTLET SIGMAP = 2.563E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 2.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.3449	0.1471	98.7634	9.210	1.2366	98.7432	9.176	1.2568
4.000E-07	1.530	0.253	6.4038	3.4405	97.0053	7.356	2.9947	96.9859	7.342	3.0141
7.000E-07	1.297	0.903	24.0564	13.0167	96.8480	7.249	3.1520	96.8050	7.220	3.1950
1.100E-06	1.188	0.815	16.2242	9.0661	97.6447	7.859	2.3553	97.5344	7.763	2.4656
1.600E-06	1.130	1.520	20.1366	11.7741	98.4326	8.713	1.5674	98.2831	8.522	1.7169
2.300E-06	1.083	3.524	23.1421	15.4156	99.2230	10.185	0.7770	99.0304	9.720	0.9696
3.500E-06	1.059	1.652	5.6379	5.4108	99.5962	11.557	0.4038	99.2740	10.327	0.7260
4.500E-06	1.046	1.652	3.2086	5.4056	99.7702	12.739	0.2298	99.2747	10.329	0.7253
6.000E-06	1.035	1.982	0.7054	5.5804	99.9579	16.297	0.0421	99.3759	10.644	0.6241
8.500E-06	1.024	3.304	0.0695	7.5756	99.9975	22.227	0.0025	99.4918	11.075	0.5082
1.250E-05	1.017	4.846	0.0041	7.6503	99.9999	31.459	0.0001	99.6501	11.857	0.3499
2.000E-05	1.010	12.115	0.0102	8.1227	99.9999	48.821	0.0001	99.8514	13.653	0.1486
2.750E-05	1.008	67.401	0.0565	7.3546	99.9999	66.304	0.0001	99.9758	17.459	0.0242

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 3.732E+00
CORRECTED SIGMAP OF EFFLUENT = 3.115E+00
LOG-NORMAL GOODNESS OF FIT = 0.973
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	6.077E-02	9.954E-04	6.176E-02	6.464E-03	2.000E-07
3.486E+00	8.104E+01	2.426E+00	1.570E-02	2.442E+00	4.740E-02	4.000E-07
3.918E+00	8.457E+01	7.922E+00	1.081E-01	8.030E+00	3.756E-01	7.000E-07
4.769E+00	8.972E+01	8.540E+00	3.998E-01	8.940E+00	8.691E-01	1.100E-06
5.911E+00	9.404E+01	1.027E+01	9.795E-01	1.125E+01	2.197E+00	1.600E-06
8.019E+00	9.782E+01	9.150E+00	2.268E+00	1.142E+01	6.563E+00	2.300E-06
1.037E+01	9.929E+01	4.753E+00	3.793E+00	8.546E+00	5.147E+00	3.300E-06
1.274E+01	9.977E+01	2.315E+00	4.991E+00	7.306E+00	7.915E+00	4.500E-06
1.630E+01	9.996E+01	4.517E-01	6.242E+00	6.694E+00	1.115E+01	6.000E-06
2.223E+01	1.000E+02	3.531E-02	7.174E+00	7.209E+00	1.616E+01	8.500E-06
3.146E+01	1.000E+02	2.022E-03	7.134E+00	7.136E+00	1.640E+01	1.250E-05
4.882E+01	1.000E+02	3.769E-03	5.648E+00	5.651E+00	1.741E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	1.524E+01	1.530E+01	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 19

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.732E+00 UM OUTLET SIGMAP = 3.115E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.1747	97.1023	7.425	2.8977	97.0645	7.398	2.9355
4.000E-07	1.530	0.253	4.0629	2.6654	94.1940	5.968	5.8060	94.1578	5.955	5.8422
7.000E-07	1.297	0.903	15.5003	10.2365	93.7940	5.828	6.2060	93.7137	5.801	6.2863
1.100E-06	1.188	0.815	11.6397	7.8913	94.8365	6.214	5.1635	94.6306	6.132	5.3694
1.600E-06	1.130	1.520	16.8762	11.7677	95.9859	6.742	4.0141	95.7068	6.601	4.2932
2.500E-06	1.083	3.524	26.2590	19.4051	97.3060	7.578	2.6940	96.9464	7.315	3.0536
3.500E-06	1.059	1.652	9.0557	7.6959	98.0181	8.221	1.9819	97.4167	7.666	2.5833
4.500E-06	1.046	1.652	7.4341	7.6024	98.3730	8.635	1.6270	97.4480	7.691	2.5520
6.000E-06	1.035	1.982	4.2085	6.6270	99.2323	10.210	0.7677	98.1458	8.361	1.8542
8.500E-06	1.024	3.304	2.9758	7.5654	99.6744	12.008	0.3256	98.7302	9.155	1.2698
1.250E-05	1.017	4.846	1.6067	6.7557	99.8801	14.103	0.1199	99.2269	10.195	0.7731
2.000E-05	1.010	12.115	0.0981	6.1252	99.9971	21.887	0.0029	99.7196	12.322	0.2804
2.750E-05	1.008	67.401	0.0185	5.4878	99.9999	66.304	0.0001	99.9548	16.151	0.0452

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.606E+00
CORRECTED SIGMAP OF EFFLUENT = 2.838E+00
LOG-NORMAL GOODNESS OF FIT = 0.985
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,424E-01	1,858E-03	1,443E-01	6,464E-03	2,000E-07
3,486E+00	8,104E+01	4,704E+00	2,931E-02	4,734E+00	4,740E-02	4,000E-07
3,918E+00	8,457E+01	1,560E+01	2,019E-01	1,580E+01	3,756E-01	7,000E-07
4,769E+00	8,972E+01	1,872E+01	7,465E-01	1,947E+01	8,691E-01	1,100E-06
5,911E+00	9,404E+01	2,630E+01	1,829E+00	2,813E+01	2,197E+00	1,600E-06
8,019E+00	9,782E+01	3,173E+01	4,234E+00	3,596E+01	6,563E+00	2,500E-06
1,037E+01	9,929E+01	2,333E+01	7,081E+00	3,041E+01	5,147E+00	3,500E-06
1,274E+01	9,977E+01	1,639E+01	9,319E+00	2,571E+01	7,915E+00	4,500E-06
1,630E+01	9,996E+01	8,235E+00	1,165E+01	1,989E+01	1,115E+01	6,000E-06
2,223E+01	1,000E+02	4,619E+00	1,339E+01	1,801E+01	1,616E+01	8,500E-06
3,146E+01	1,000E+02	2,444E+00	1,332E+01	1,576E+01	1,640E+01	1,250E-05
4,882E+01	1,000E+02	1,113E-01	1,054E+01	1,066E+01	1,741E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	2,845E+01	2,851E+01	1,576E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 20

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.606E+00 UM OUTLET SIGMAP = 2.638E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.1435	92.7505	5.502	7.2495	92.6757	5.481	7.3243
4.000E-07	1.530	0.253	2.3354	1.8171	87.9714	4.441	12.0286	87.8999	4.428	12.1001
7.000E-07	1.297	0.903	8.8651	6.9419	87.2072	4.311	12.7928	87.0484	4.286	12.9516
1.100E-06	1.188	0.815	7.1634	5.7375	88.5468	4.543	11.4532	88.1398	4.470	11.8602
1.600E-06	1.130	1.520	11.5362	9.4205	90.1102	4.851	9.8898	89.5585	4.737	10.4415
2.500E-06	1.083	3.524	21.6945	18.2666	91.9780	5.290	8.0220	91.2672	5.112	8.7328
3.500E-06	1.059	1.652	9.0002	8.1272	92.9008	5.546	7.0992	91.7118	5.221	8.2882
4.500E-06	1.046	1.652	8.6513	8.4844	93.1761	5.629	6.8239	91.3475	5.131	8.6525
6.000E-06	1.035	1.982	7.3927	8.2447	95.1397	6.341	4.8603	92.9919	5.573	7.0081
8.500E-06	1.024	3.304	9.1127	10.7086	96.4060	6.973	3.5940	94.5396	6.096	5.4604
1.250E-05	1.017	4.846	9.0758	10.7340	97.5596	7.785	2.4404	96.2683	6.895	3.7317
2.000E-05	1.010	12.115	2.9234	6.2052	99.6856	12.081	0.3144	99.1371	9.965	0.8629
2.750E-05	1.008	67.401	2.0658	5.1687	99.9601	16.408	0.0399	99.8708	13.946	0.1292

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 4.228E+00
CORRECTED SIGMAP OF EFFLUENT = 2.755E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.562E-01	3.674E-03	3.599E-01	6.464E-03	2.000E-07
3.486E+00	8.104E+01	9.746E+00	5.793E-02	9.804E+00	4.740E-02	4.000E-07
3.918E+00	8.457E+01	3.215E+01	3.990E-01	3.255E+01	3.756E-01	7.000E-07
4.769E+00	8.972E+01	4.153E+01	1.476E+00	4.300E+01	8.691E-01	1.100E-06
5.911E+00	9.404E+01	6.480E+01	3.615E+00	6.842E+01	2.197E+00	1.600E-06
8.019E+00	9.782E+01	9.447E+01	8.371E+00	1.028E+02	6.563E+00	2.500E-06
1.037E+01	9.929E+01	8.357E+01	1.400E+01	9.757E+01	5.147E+00	3.500E-06
1.274E+01	9.977E+01	6.875E+01	1.842E+01	8.717E+01	7.915E+00	4.500E-06
1.630E+01	9.996E+01	5.213E+01	2.304E+01	7.517E+01	1.115E+01	6.000E-06
2.223E+01	1.000E+02	5.098E+01	2.648E+01	7.746E+01	1.616E+01	8.500E-06
3.146E+01	1.000E+02	4.976E+01	2.633E+01	7.609E+01	1.640E+01	1.250E-05
4.882E+01	1.000E+02	1.195E+01	2.084E+01	3.279E+01	1.741E+01	2.000E-05
6.630E+01	1.000E+02	2.517E+01	5.624E+01	8.141E+01	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 21

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.228E+00 UM OUTLET SIGMAP = 2.755E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP N	NO-RAP P	COR. EFF.	COR. N	COR. P
2.000E-07	2.123	0.033	0.1213	0.1061	83.3481	3.759	16.6519	83.2125	3.742	16.7875
4.000E-07	1.530	0.253	1.3078	1.1407	76.5857	3.044	23.4143	76.4560	3.032	23.5440
7.000E-07	1.297	0.903	4.9032	4.3029	75.4048	2.941	24.5952	75.1168	2.916	24.8832
1.100E-06	1.188	0.815	4.1624	3.7257	76.8663	3.069	23.1337	76.1280	3.003	23.8720
1.600E-06	1.130	1.520	7.1693	6.5100	78.6357	3.236	21.3643	77.6349	3.140	22.3651
2.500E-06	1.083	3.524	14.9949	13.8770	80.7263	3.452	19.2737	79.4367	3.316	20.5633
3.500E-06	1.059	1.652	6.7415	6.5301	81.5156	3.540	18.4844	79.3585	3.308	20.6415
4.500E-06	1.046	1.652	6.7972	6.9454	81.3630	3.522	18.6370	78.0457	3.179	21.9543
6.000E-06	1.035	1.982	6.8997	7.4637	84.2318	3.873	15.7682	80.3354	3.410	19.6646
8.500E-06	1.024	3.304	10.1042	10.9068	86.1477	4.145	13.8523	82.7618	3.686	17.2382
1.250E-05	1.017	4.846	12.2164	12.7705	88.5813	4.550	11.4187	86.2387	4.158	13.7613
2.000E-05	1.010	12.115	9.2214	10.3071	96.5523	7.061	3.4477	95.5573	6.529	4.4427
2.750E-05	1.008	67.401	15.3608	15.4141	98.9677	9.589	1.0323	98.8058	9.283	1.1942

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 94.7780
CORRECTED MMD OF EFFLUENT = 6.616E+00
CORRECTED SIGMAP OF EFFLUENT = 3.126E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E+01	6.665E-03	8.249E-01	6.464E-03	2.000E-07
3.486E+00	8.104E+01	1.897E+01	1.051E-01	1.908E+01	4.740E-02	4.000E-07
3.918E+00	8.457E+01	6.181E+01	7.239E-01	6.254E+01	3.756E-01	7.000E-07
4.769E+00	8.972E+01	8.388E+01	2.677E+00	8.656E+01	8.691E-01	1.100E-06
5.911E+00	9.404E+01	1.400E+02	6.558E+00	1.465E+02	2.197E+00	1.600E-06
8.019E+00	9.782E+01	2.270E+02	1.519E+01	2.422E+02	6.563E+00	2.500E-06
1.037E+01	9.929E+01	2.176E+02	2.539E+01	2.430E+02	5.147E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	3.342E+01	2.212E+02	7.915E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	4.179E+01	2.109E+02	1.115E+01	6.000E-06
2.223E+01	1.000E+02	1.965E+02	4.803E+01	2.445E+02	1.616E+01	8.500E-06
3.146E+01	1.000E+02	2.328E+02	4.776E+01	2.806E+02	1.640E+01	1.250E-05
4.882E+01	1.000E+02	1.310E+02	3.781E+01	1.688E+02	1.741E+01	2.000E-05
6.630E+01	1.000E+02	6.505E+02	1.020E+02	7.525E+02	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 22

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 6.616E+00 UM OUTLET SIGMAP = 3.126E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET % COR.	OUTLET % NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.0728	0.0686	64.3675	2.164	35.6325	64.1539	2.151	35.8461
4.000E-07	1.530	0.253	0.6774	0.6376	56.7538	1.758	43.2462	56.5495	1.748	43.4505
7.000E-07	1.297	0.903	2.4961	2.3620	55.3530	1.691	44.6470	54.8994	1.670	45.1006
1.100E-06	1.188	0.815	2.1898	2.1063	56.6033	1.750	43.3967	55.4406	1.695	44.5594
1.600E-06	1.130	1.520	3.9380	3.8279	58.1548	1.827	41.8452	56.3787	1.749	43.4213
2.500E-06	1.083	3.524	8.7495	8.6112	59.8988	1.916	40.1012	57.8680	1.812	42.1320
3.500E-06	1.059	1.652	4.0669	4.1352	60.2386	1.934	39.7614	56.8416	1.762	43.1584
4.500E-06	1.046	1.652	4.1342	4.3733	59.5802	1.899	40.4198	54.3561	1.644	45.6439
6.000E-06	1.035	1.982	4.5999	5.0143	62.5155	2.057	37.4845	56.3794	1.739	43.6206
8.500E-06	1.024	3.304	7.2745	7.8362	64.4392	2.168	35.5608	59.1069	1.875	40.8931
1.250E-05	1.017	4.846	9.7411	10.1619	67.5336	2.359	32.4664	63.8445	2.133	36.1555
2.000E-05	1.010	12.115	13.0892	13.3625	82.5497	3.660	17.4503	80.9828	3.480	19.0172
2.750E-05	1.008	67.401	38.9707	37.5030	90.6614	4.971	9.3386	90.4064	4.915	9.5936

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.323E+01
CORRECTED SIGMAP OF EFFLUENT = 3.804E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	1.050E-02	1.761E+00	6.464E-03	2.000E-07
3.486E+00	8.104E+01	3.504E+01	1.655E-01	3.521E+01	4.740E-02	4.000E-07
3.918E+00	8.457E+01	1.122E+02	1.140E+00	1.133E+02	3.756E-01	7.000E-07
4.769E+00	8.972E+01	1.573E+02	4.216E+00	1.616E+02	8.691E-01	1.100E-06
5.911E+00	9.404E+01	2.742E+02	1.033E+01	2.845E+02	2.197E+00	1.600E-06
8.019E+00	9.782E+01	4.722E+02	2.392E+01	4.962E+02	6.563E+00	2.900E-06
1.037E+01	9.929E+01	4.681E+02	3.999E+01	5.081E+02	5.147E+00	3.900E-06
1.274E+01	9.977E+01	4.072E+02	5.263E+01	4.598E+02	7.915E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	6.582E+01	4.679E+02	1.115E+01	6.000E-06
2.223E+01	1.000E+02	5.045E+02	7.564E+01	5.801E+02	1.616E+01	8.500E-06
3.146E+01	1.000E+02	6.620E+02	7.522E+01	7.372E+02	1.640E+01	1.250E-05
4.882E+01	1.000E+02	6.632E+02	5.955E+01	7.227E+02	1.741E+01	2.000E-05
6.630E+01	1.000E+02	5.884E+03	1.607E+02	6.045E+03	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 23

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.323E+01 UM OUTLET SIGMAP = 3.804E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.1829	97.6762	7.888	2.3238	97.6445	7.859	2.3555
4.000E-07	1.530	0.253	4.7115	2.9350	95.0987	6.323	4.9013	95.0683	6.310	4.9317
7.000E-07	1.297	0.903	17.8491	11.1939	94.7976	6.198	5.2024	94.7302	6.171	5.2698
1.100E-06	1.188	0.815	12.9822	8.3688	95.8076	6.650	4.1924	95.6348	6.566	4.3652
1.600E-06	1.130	1.520	18.0331	12.0020	96.8775	7.268	3.1225	96.6433	7.117	3.3567
2.500E-06	1.083	3.524	26.0236	18.6133	98.0564	8.262	1.9436	97.7546	7.960	2.2454
3.500E-06	1.059	1.652	8.3261	7.1165	98.6735	9.063	1.3265	98.1687	8.387	1.8313
4.500E-06	1.046	1.652	6.3882	6.9718	98.9823	9.619	1.0177	98.2059	8.430	1.7941
6.000E-06	1.035	1.982	3.0611	6.1464	99.5935	11.543	0.4065	98.6817	9.076	1.3183
8.500E-06	1.024	3.304	1.6599	7.1862	99.8678	13.898	0.1322	99.0754	9.820	0.9246
1.250E-05	1.017	4.846	0.6293	6.6389	99.9658	16.735	0.0342	99.4176	10.789	0.5824
2.000E-05	1.010	12.115	0.0192	6.6359	99.9996	48.821	0.0004	99.7672	12.711	0.2328
2.750E-05	1.008	67.401	0.0254	6.0083	99.9999	66.304	0.0001	99.9621	16.518	0.0379

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 3.584E+00
CORRECTED SIGMAP OF EFFLUENT = 2.913E+00
LOG-NORMAL GOODNESS OF FIT = 0.981
CORRECTED PRECIPITATION RATE PARAMETER = 11.65

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,142E-01	1,560E-03	1,158E-01	6,464E-03	2,000E-07
3,486E+00	8,104E+01	3,971E+00	2,460E-02	3,996E+00	4,740E-02	4,000E-07
3,918E+00	8,457E+01	1,30AE+01	1,694E-01	1,324E+01	3,756E-01	7,000E-07
4,769E+00	8,972E+01	1,520E+01	6,265E-01	1,583E+01	8,691E-01	1,100E-06
5,911E+00	9,404E+01	2,046E+01	1,535E+00	2,200E+01	2,197E+00	1,600E-06
8,019E+00	9,782E+01	2,289E+01	3,554E+00	2,644E+01	6,563E+00	2,500E-06
1,037E+01	9,929E+01	1,562E+01	5,943E+00	2,156E+01	5,147E+00	3,500E-06
1,274E+01	9,977E+01	1,025E+01	7,821E+00	1,807E+01	7,915E+00	4,500E-06
1,630E+01	9,996E+01	4,360E+00	9,781E+00	1,414E+01	1,115E+01	6,000E-06
2,223E+01	1,000E+02	1,876E+00	1,124E+01	1,312E+01	1,616E+01	8,500E-06
3,146E+01	1,000E+02	6,968E-01	1,118E+01	1,187E+01	1,640E+01	1,250E-05
4,882E+01	1,000E+02	1,587E-02	8,849E+00	8,865E+00	1,741E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	2,388E+01	2,394E+01	1,576E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 24

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.584E+00 UM OUTLET SIGMAP = 2.913E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.1673	96.1885	6.850	3.8115	96.1421	6.825	3.8579
4.000E-07	1.530	0.253	3.4620	2.4026	92.8186	5.522	7.1814	92.7743	5.509	7.2257
7.000E-07	1.297	0.903	13.2808	9.2770	92.2814	5.371	7.7186	92.1830	5.344	7.8170
1.100E-06	1.188	0.815	10.3039	7.3772	93.3648	5.688	6.6352	93.1127	5.610	6.8873
1.600E-06	1.130	1.520	15.5806	11.4294	94.6205	6.128	5.3795	94.2786	5.999	5.7214
2.500E-06	1.083	3.524	25.9676	19.9508	96.1328	6.820	3.8672	95.6923	6.594	4.3077
3.500E-06	1.059	1.652	9.5269	8.1707	96.9735	7.334	3.0265	96.2367	6.877	3.7633
4.500E-06	1.046	1.652	8.2266	8.1342	97.3866	7.641	2.6134	96.2535	6.886	3.7465
6.000E-06	1.035	1.982	5.3236	7.1385	98.5904	8.936	1.4096	97.2595	7.542	2.7405
8.500E-06	1.024	3.304	4.5539	8.1629	99.2766	10.335	0.7234	98.1202	8.332	1.8798
1.250E-05	1.017	4.846	3.1180	7.2465	99.6623	11.932	0.3377	98.8622	9.385	1.1378
2.000E-05	1.010	12.115	0.3371	5.6436	99.9854	18.517	0.0146	99.6456	11.830	0.3544
2.750E-05	1.008	67.401	0.0794	4.8993	99.9994	66.304	0.0006	99.9447	15.725	0.0553

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.647E+00
CORRECTED SIGMAP OF EFFLUENT = 2.769E+00
LOG-NORMAL GOODNESS OF FIT = 0.989
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	2.276E-03	1.896E-01	6.464E-03	2.000E-07
3.486E+00	8.104E+01	5.819E+00	3.590E-02	5.855E+00	4.740E-02	4.000E-07
3.918E+00	8.457E+01	1.940E+01	2.473E-01	1.965E+01	3.756E-01	7.000E-07
4.769E+00	8.972E+01	2.406E+01	9.144E-01	2.497E+01	8.691E-01	1.100E-06
5.911E+00	9.404E+01	3.525E+01	2.240E+00	3.709E+01	2.197E+00	1.600E-06
8.019E+00	9.782E+01	4.554E+01	5.187E+00	5.073E+01	6.563E+00	2.500E-06
1.037E+01	9.929E+01	3.563E+01	8.673E+00	4.430E+01	5.147E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	1.141E+01	3.774E+01	7.915E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	1.428E+01	2.940E+01	1.115E+01	6.000E-06
2.223E+01	1.000E+02	1.026E+01	1.641E+01	2.667E+01	1.616E+01	8.500E-06
3.146E+01	1.000E+02	6.885E+00	1.631E+01	2.320E+01	1.680E+01	1.250E-05
4.882E+01	1.000E+02	5.550E-01	1.292E+01	1.347E+01	1.741E+01	2.000E-05
6.630E+01	1.000E+02	3.894E-01	3.485E+01	3.524E+01	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 25

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 8.159E+04 V

AVG. CURRENT DENSITY = 18.08 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.697E+00 UM OUTLET SIGMAP = 2.769E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAS = 0.40

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.1584	94.3710	6.033	5.6290	94.3102	6.010	5.6898
4.000E-07	1.530	0.253	2.8175	2.0920	90.2545	4.882	9.7455	90.1964	4.869	9.8036
7.000E-07	1.297	0.903	10.8492	8.1060	89.4860	4.723	10.5140	89.3568	4.697	10.6432
1.100E-06	1.188	0.815	8.7455	6.6825	90.6096	4.960	9.3904	90.2784	4.887	9.7216
1.600E-06	1.130	1.520	13.8731	10.8150	92.0129	5.299	7.9871	91.5640	5.184	8.4360
2.500E-06	1.083	3.524	24.9052	20.1012	93.8154	5.835	6.1846	93.2370	5.648	6.7630
3.500E-06	1.059	1.652	9.7131	8.5171	94.8548	6.221	5.1452	93.8873	5.860	6.1127
4.500E-06	1.046	1.652	8.7730	8.5483	95.3527	6.434	4.6473	93.8649	5.852	6.1351
6.000E-06	1.035	1.982	6.4826	7.7060	97.1378	7.451	2.8622	95.3902	6.451	4.6098
8.500E-06	1.024	3.304	6.5732	9.0834	98.2590	8.493	1.7410	96.7404	7.178	3.2596
1.250E-05	1.017	4.846	5.5095	8.3608	99.0051	9.666	0.9949	97.9548	8.155	2.0456
2.000E-05	1.010	12.115	1.0816	5.3582	99.9219	15.001	0.0781	99.4756	11.009	0.5244
2.750E-05	1.008	67.401	0.4642	4.4712	99.9940	20.373	0.0060	99.9213	14.987	0.0787

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 3.776E+00
CORRECTED SIGMAP OF EFFLUENT = 2.714E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	2,766E-01	2,989E-03	2,796E-01	6,464E-03	2,000E-07
3,486E+00	8,104E+01	7,896E+00	4,718E-02	7,943E+00	4,740E-02	4,000E-07
3,918E+00	8,457E+01	2,642E+01	3,297E-01	2,675E+01	3,756E-01	7,000E-07
4,769E+00	8,972E+01	3,405E+01	1,201E+00	3,525E+01	8,691E-01	1,100E-06
5,911E+00	9,404E+01	5,234E+01	2,991E+00	5,528E+01	2,197E+00	1,600E-06
8,019E+00	9,782E+01	7,283E+01	6,811E+00	7,964E+01	4,563E+00	2,500E-06
1,037E+01	9,929E+01	6,057E+01	1,139E+01	7,196E+01	5,147E+00	3,500E-06
1,274E+01	9,977E+01	4,682E+01	1,499E+01	6,181E+01	7,915E+00	4,500E-06
1,630E+01	9,996E+01	3,070E+01	1,875E+01	4,945E+01	1,115E+01	6,000E-06
2,223E+01	1,000E+02	2,470E+01	2,154E+01	4,624E+01	1,616E+01	8,500E-06
3,146E+01	1,000E+02	2,029E+01	2,142E+01	4,171E+01	1,640E+01	1,250E-05
4,882E+01	1,000E+02	2,969E+00	1,696E+01	1,993E+01	1,741E+01	2,000E-05
6,630E+01	1,000E+02	3,798E+00	4,576E+01	4,956E+01	1,576E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 26

ESP PERFORMANCE: EFFICIENCY = 98.8188 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.776E+00 UM OUTLET SIGMAP = 2.714E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.1504	91.8187	5.249	8.1813	91.7407	5.229	8.2593
4.000E-07	1.530	0.253	2.3418	1.8381	86.9043	4.262	13.0957	86.8297	4.250	13.1703
7.000E-07	1.297	0.903	9.0162	7.1193	85.8735	4.103	14.1265	85.7080	4.079	14.2920
1.100E-06	1.188	0.815	7.4873	6.0343	87.0024	4.278	12.9976	86.5780	4.211	13.4220
1.600E-06	1.130	1.520	12.3234	10.1003	88.5295	4.540	11.4705	87.9542	4.438	12.0458
2.500E-06	1.083	3.524	23.3765	19.6854	90.6149	4.961	9.3851	89.8736	4.801	10.1264
3.500E-06	1.059	1.652	9.5059	8.5489	91.8589	5.259	8.1411	90.6190	4.962	9.3810
4.500E-06	1.046	1.652	8.8244	8.6247	92.4426	5.415	7.5574	90.5359	4.943	9.4641
6.000E-06	1.035	1.982	7.1634	8.0394	94.8866	6.234	5.1134	92.6470	5.472	7.3530
8.500E-06	1.024	3.304	8.1009	9.8697	96.5311	7.048	3.4689	94.5849	6.114	5.4151
1.250E-05	1.017	4.846	7.6993	9.6085	97.7522	7.957	2.2478	96.4057	6.973	3.5943
2.000E-05	1.010	12.115	2.3700	5.6719	99.7232	12.349	0.2768	99.1513	10.000	0.8487
2.750E-05	1.008	67.401	1.6000	4.7092	99.9664	16.771	0.0336	99.8733	13.988	0.1267

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 2.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 4.011E+00
CORRECTED SIGMAP OF EFFLUENT = 2.713E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	3.831E-03	4.059E-01	6.464E-03	2.000E-07
3.486E+00	8.104E+01	1.061E+01	6.041E-02	1.067E+01	4.740E-02	4.000E-07
3.918E+00	8.457E+01	3.550E+01	4.161E-01	3.592E+01	3.756E-01	7.000E-07
4.769E+00	8.972E+01	4.713E+01	1.539E+00	4.867E+01	8.691E-01	1.100E-06
5.911E+00	9.404E+01	7.516E+01	3.769E+00	7.893E+01	2.197E+00	1.600E-06
8.019E+00	9.782E+01	1.105E+02	8.729E+00	1.193E+02	6.563E+00	2.500E-06
1.037E+01	9.929E+01	9.548E+01	1.460E+01	1.104E+02	5.147E+00	3.500E-06
1.274E+01	9.977E+01	7.614E+01	1.921E+01	9.534E+01	7.915E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	2.402E+01	7.887E+01	1.115E+01	6.000E-06
2.223E+01	1.000E+02	4.921E+01	2.761E+01	7.682E+01	1.616E+01	8.500E-06
3.146E+01	1.000E+02	4.583E+01	2.745E+01	7.329E+01	1.640E+01	1.250E-05
4.882E+01	1.000E+02	1.052E+01	2.174E+01	3.225E+01	1.741E+01	2.000E-05
6.630E+01	1.000E+02	2.116E+01	5.865E+01	7.981E+01	1.576E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 27

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.011E+00 UM OUTLET SIGMAP = 2.713E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.3449	0.1846	98.7634	9.210	1.2366	98.7604	9.205	1.2396
4.000E-07	1.530	0.253	6.4038	3.4227	97.0053	7.356	2.9947	97.0015	7.353	2.9985
7.000E-07	1.297	0.903	24.0564	12.8865	96.8480	7.249	3.1520	96.8370	7.241	3.1630
1.100E-06	1.188	0.815	16.2242	8.7881	97.6447	7.859	2.3553	97.6100	7.829	2.3900
1.600E-06	1.130	1.520	20.1366	11.1347	98.4326	8.713	1.5674	98.3764	8.639	1.6236
2.500E-06	1.083	3.524	23.1421	13.7804	99.2230	10.185	0.7770	99.1333	9.955	0.8667
3.500E-06	1.059	1.652	5.6379	4.3210	99.5962	11.557	0.4038	99.4203	10.799	0.5797
4.500E-06	1.046	1.652	3.2086	3.9878	99.7702	12.739	0.2298	99.4650	10.967	0.5350
6.000E-06	1.035	1.982	0.7054	4.0550	99.9579	16.297	0.0421	99.5465	11.314	0.4535
8.500E-06	1.024	3.304	0.0695	6.3184	99.9975	22.227	0.0025	99.5761	11.455	0.4239
1.250E-05	1.017	4.846	0.0041	7.6563	99.9999	31.459	0.0001	99.6498	11.856	0.3502
2.000E-05	1.010	12.115	0.0102	10.0684	99.9999	48.821	0.0001	99.8158	13.203	0.1842
2.750E-05	1.008	67.401	0.0565	13.3961	99.9999	66.304	0.0001	99.9559	16.202	0.0441

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 4.426E+00
CORRECTED SIGMAP OF EFFLUENT = 3.505E+00
LOG-NORMAL GOODNESS OF FIT = 0.958
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	6,077E-02	1,506E-04	6,092E-02	9,779E-04	2,000E-07
3,486E+00	8,104E+01	2,426E+00	3,082E-03	2,430E+00	9,305E-03	4,000E-07
3,918E+00	8,457E+01	7,922E+00	2,780E-02	7,950E+00	9,659E-02	7,000E-07
4,769E+00	8,972E+01	8,540E+00	1,258E-01	8,666E+00	2,734E-01	1,100E-06
5,911E+00	9,404E+01	1,027E+01	3,685E-01	1,064E+01	8,265E-01	1,400E-06
8,019E+00	9,782E+01	9,150E+00	1,057E+00	1,021E+01	3,059E+00	2,500E-06
1,037E+01	9,929E+01	4,753E+00	2,071E+00	6,825E+00	2,811E+00	3,500E-06
1,274E+01	9,977E+01	2,315E+00	3,075E+00	5,390E+00	4,876E+00	4,500E-06
1,630E+01	9,996E+01	4,517E-01	4,412E+00	4,864E+00	7,884E+00	6,000E-06
2,223E+01	1,000E+02	3,531E-02	5,978E+00	6,013E+00	1,346E+01	8,500E-06
3,146E+01	1,000E+02	2,022E-03	7,139E+00	7,141E+00	1,641E+01	1,250E-05
4,882E+01	1,000E+02	3,769E-03	7,000E+00	7,004E+00	2,158E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	2,776E+01	2,782E+01	2,871E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 28

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.426E+00 UM OUTLET SIGMAP = 3.505E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.1728	97.1023	7.425	2.8977	97.0966	7.421	2.9034
4.000E-07	1.530	0.253	4.0629	2.6521	94.1940	5.968	5.8060	94.1869	5.965	5.8131
7.000E-07	1.297	0.903	15.5003	10.1394	93.7940	5.828	6.2060	93.7733	5.821	6.2267
1.100E-06	1.188	0.815	11.6397	7.6839	94.8365	6.214	5.1635	94.7717	6.188	5.2283
1.600E-06	1.130	1.520	16.8762	11.2905	95.9859	6.742	4.0141	95.8809	6.687	4.1191
2.500E-06	1.083	3.524	26.2590	18.1849	97.3060	7.578	2.6940	97.1384	7.451	2.8616
3.500E-06	1.059	1.652	9.0557	6.8826	98.0181	8.221	1.9819	97.6897	7.900	2.3103
4.500E-06	1.046	1.652	7.4341	6.5445	98.3730	8.635	1.6270	97.8032	8.005	2.1968
6.000E-06	1.035	1.982	4.2085	5.4886	99.2323	10.210	0.7677	98.4643	8.756	1.5357
8.500E-06	1.024	3.304	2.9758	6.6272	99.6744	12.008	0.3256	98.8877	9.432	1.1123
1.250E-05	1.017	4.846	1.6067	6.7601	99.8801	14.103	0.1199	99.2264	10.194	0.7736
2.000E-05	1.010	12.115	0.0981	7.5770	99.9971	21.887	0.0029	99.6532	11.876	0.3468
2.750E-05	1.008	67.401	0.0185	9.9964	99.9999	66.304	0.0001	99.9178	14.893	0.0822

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 4.103E+00
CORRECTED SIGMAP OF EFFLUENT = 3.096E+00
LOG-NORMAL GOODNESS OF FIT = 0.976
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,494E-01	2,811E-04	1,427E-01	9,779E-04	2,000E-07
3,486E+00	8,104E+01	4,704E+00	5,753E-03	4,710E+00	9,305E-03	4,000E-07
3,918E+00	8,457E+01	1,560E+01	5,190E-02	1,565E+01	9,659E-02	7,000E-07
4,769E+00	8,972E+01	1,872E+01	2,348E-01	1,896E+01	2,734E-01	1,100E-06
5,911E+00	9,404E+01	2,630E+01	6,879E-01	2,699E+01	8,265E-01	1,600E-06
8,019E+00	9,782E+01	3,173E+01	1,973E+00	3,370E+01	3,059E+00	2,500E-06
1,037E+01	9,929E+01	2,333E+01	3,867E+00	2,720E+01	2,811E+00	3,500E-06
1,274E+01	9,977E+01	1,639E+01	5,741E+00	2,213E+01	4,876E+00	4,500E-06
1,630E+01	9,996E+01	8,235E+00	8,238E+00	1,647E+01	7,884E+00	6,000E-06
2,223E+01	1,000E+02	4,619E+00	1,116E+01	1,578E+01	1,346E+01	8,500E-06
3,146E+01	1,000E+02	2,444E+00	1,333E+01	1,577E+01	1,641E+01	1,250E-05
4,882E+01	1,000E+02	1,113E-01	1,307E+01	1,318E+01	2,158E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	5,182E+01	5,189E+01	2,871E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 29

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.103E+00 UM OUTLET SIGMAP = 3.096E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.1422	92.7505	5.502	7.2495	92.7392	5.499	7.2608
4.000E-07	1.530	0.253	2.3354	1.8085	87.9714	8.441	12.0286	87.9574	8.438	12.0426
7.000E-07	1.297	0.903	8.8651	6.8787	87.2072	8.311	12.7928	87.1664	8.305	12.8336
1.100E-06	1.188	0.815	7.1634	5.6025	88.5468	8.543	11.4532	88.4188	8.520	11.5812
1.600E-06	1.130	1.520	11.5362	9.1100	90.1102	8.851	9.8898	89.9027	8.807	10.0973
2.500E-06	1.083	3.524	21.6945	17.4726	91.9780	5.290	8.0220	91.6468	5.205	8.3532
3.500E-06	1.059	1.652	9.0002	7.5986	92.9008	5.546	7.0992	92.2514	5.363	7.7486
4.500E-06	1.046	1.652	8.6513	7.7960	93.1761	5.629	6.8239	92.0495	5.309	7.9505
6.000E-06	1.035	1.982	7.3927	7.5040	95.1397	6.341	4.8603	93.6215	5.771	6.3785
8.500E-06	1.024	3.304	9.1127	10.0982	96.4060	6.973	3.5940	94.8509	6.219	5.1491
1.250E-05	1.017	4.846	9.0758	10.7369	97.5596	7.785	2.4404	96.2673	6.894	3.7327
2.000E-05	1.010	12.115	2.9234	7.1499	99.6856	12.081	0.3144	99.0057	9.668	0.9943
2.750E-05	1.008	67.401	2.0658	8.1025	99.9601	16.408	0.0399	99.7975	13.004	0.2025

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 4.625E+00
CORRECTED SIGMAP OF EFFLUENT = 2.90AE+00
LOG-NORMAL GOODNESS OF FIT = 0.991
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.542E-01	5.558E-04	3.588E-01	9.779E-04	2.000E-07
3.486E+00	8.104E+01	9.744E+00	1.137E-02	9.757E+00	9.305E-03	4.000E-07
3.918E+00	8.457E+01	3.215E+01	1.026E-01	3.225E+01	9.659E-02	7.000E-07
4.769E+00	8.972E+01	4.153E+01	4.642E-01	4.199E+01	2.734E-01	1.100E-06
5.911E+00	9.404E+01	6.800E+01	1.360E+00	6.861E+01	8.765E-01	1.600E-06
8.019E+00	9.782E+01	9.467E+01	3.901E+00	9.837E+01	3.059E+00	2.500E-06
1.037E+01	9.929E+01	8.357E+01	7.645E+00	9.122E+01	2.811E+00	3.500E-06
1.274E+01	9.977E+01	6.875E+01	1.135E+01	8.010E+01	4.276E+00	4.500E-06
1.630E+01	9.996E+01	5.213E+01	1.628E+01	6.842E+01	7.884E+00	6.000E-06
2.223E+01	1.000E+02	5.092E+01	2.206E+01	7.305E+01	1.346E+01	8.500E-06
3.146E+01	1.000E+02	4.976E+01	2.635E+01	7.611E+01	1.641E+01	1.250E-05
4.882E+01	1.000E+02	1.195E+01	2.584E+01	3.779E+01	2.158E+01	2.000E-05
6.630E+01	1.000E+02	2.517E+01	1.024E+02	1.276E+02	2.871E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 30

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.625E+00 UM OUTLET SIGMAP = 2.908E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.1054	83.3481	3.759	16.6519	83.3276	3.756	16.6724
4.000E-07	1.530	0.253	1.3078	1.1356	76.5857	3.044	23.4143	76.5603	3.042	23.4397
7.000E-07	1.297	0.903	4.9032	4.2659	75.4048	2.941	24.5952	75.3307	2.935	24.6693
1.100E-06	1.188	0.815	4.1624	3.6468	76.8663	3.069	23.1337	76.6341	3.048	23.3659
1.600E-06	1.130	1.520	7.1693	6.3283	78.6357	3.236	21.3643	78.2592	3.200	21.7408
2.500E-06	1.083	3.524	14.9949	13.4123	80.7263	3.452	19.2737	80.1253	3.388	19.8747
3.500E-06	1.059	1.652	6.7415	6.2203	81.5156	3.540	18.4844	80.3376	3.410	19.6624
4.500E-06	1.046	1.652	6.7972	6.5425	81.3630	3.522	18.6370	79.3193	3.304	20.6807
6.000E-06	1.035	1.982	8.8997	7.0302	84.2318	3.873	15.7682	81.4776	3.535	18.5224
8.500E-06	1.024	3.304	10.1042	10.5495	86.1477	4.145	13.8523	83.3265	3.756	16.6735
1.250E-05	1.017	4.846	12.2164	12.7722	88.5813	4.550	11.4187	86.2369	4.158	13.7631
2.000E-05	1.010	12.115	9.2214	10.8600	96.5523	7.061	3.4477	95.3190	6.419	4.6810
2.750E-05	1.008	67.401	15.3608	17.1311	98.9677	9.589	1.0323	98.6727	9.062	1.3273

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 98.7780
CORRECTED MMD OF EFFLUENT = 6.969E+00
CORRECTED SIGMAP OF EFFLUENT = 3.203E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	8,183E-01	1,008E-03	8,193E-01	9,779E-04	2,000E-07
3,486E+00	8,104E+01	1,897E+01	2,063E-02	1,899E+01	9,305E-03	4,000E-07
3,918E+00	8,457E+01	6,181E+01	1,861E-01	6,200E+01	9,659E-02	7,000E-07
4,769E+00	8,972E+01	8,388E+01	8,421E-01	8,472E+01	2,734E-01	1,100E-06
5,911E+00	9,404E+01	1,400E+02	2,467E+00	1,425E+02	8,265E-01	1,600E-06
8,019E+00	9,782E+01	2,270E+02	7,077E+00	2,341E+02	3,059E+00	2,500E-06
1,037E+01	9,929E+01	2,176E+02	1,387E+01	2,315E+02	2,811E+00	3,500E-06
1,274E+01	9,977E+01	1,878E+02	2,059E+01	2,083E+02	4,876E+00	4,500E-06
1,630E+01	9,996E+01	1,691E+02	2,954E+01	1,987E+02	7,884E+00	6,000E-06
2,223E+01	1,000E+02	1,965E+02	4,002E+01	2,365E+02	1,346E+01	8,500E-06
3,146E+01	1,000E+02	2,328E+02	4,780E+01	2,806E+02	1,641E+01	1,250E-05
4,882E+01	1,000E+02	1,310E+02	4,687E+01	1,779E+02	2,158E+01	2,000E-05
6,630E+01	1,000E+02	6,505E+02	1,859E+02	8,363E+02	2,871E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 31

ESP PERFORMANCE: EFFICIENCY = 99.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 6.969E+00 UM OUTLET SIGMAP = 3.203E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.0728	0.0683	64.3675	2.164	35.6325	64.3352	2.162	35.6648
4.000E-07	1.530	0.253	0.6774	0.6352	56.7538	1.758	43.2462	56.7137	1.756	43.2863
7.000E-07	1.297	0.903	2.4961	2.3448	55.3530	1.691	44.6470	55.2363	1.685	44.7637
1.100E-06	1.188	0.815	2.1898	2.0686	56.6033	1.750	43.3967	56.2376	1.733	43.7624
1.600E-06	1.130	1.520	3.9380	3.7412	58.1548	1.827	41.8452	57.5619	1.797	42.4381
2.500E-06	1.083	3.524	8.7495	8.3896	59.8988	1.916	40.1012	58.9524	1.867	41.0476
3.500E-06	1.059	1.652	4.0669	3.9874	60.2386	1.934	39.7614	58.3834	1.838	41.6166
4.500E-06	1.046	1.652	4.1342	4.1811	59.5802	1.899	40.4198	56.3618	1.739	43.6382
6.000E-06	1.035	1.982	4.5999	4.8075	62.5155	2.057	37.4845	58.1782	1.828	41.8218
8.500E-06	1.024	3.304	7.2745	7.6658	64.4392	2.168	35.5608	59.9962	1.921	40.0038
1.250E-05	1.017	4.846	9.7411	10.1627	67.5336	2.359	32.4664	63.8416	2.133	36.1584
2.000E-05	1.010	12.115	13.0892	13.6262	82.5497	3.660	17.4503	80.6075	3.439	19.3925
2.750E-05	1.008	67.401	38.9707	38.3220	90.6614	4.971	9.3386	90.1969	4.869	9.8031

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.368E+01
CORRECTED SIGMAP OF EFFLUENT = 3.852E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	1.588E-03	1.753E+00	9.779E-04	2.000E-07
3.486E+00	8.104E+01	3.504E+01	3.249E-02	3.507E+01	9.305E-03	4.000E-07
3.918E+00	8.457E+01	1.122E+02	2.931E-01	1.125E+02	9.659E-02	7.000E-07
4.769E+00	8.972E+01	1.573E+02	1.326E+00	1.587E+02	2.734E-01	1.100E-06
5.911E+00	9.404E+01	2.742E+02	3.885E+00	2.781E+02	8.265E-01	1.600E-06
8.019E+00	9.782E+01	4.722E+02	1.114E+01	4.834E+02	3.059E+00	2.500E-06
1.037E+01	9.929E+01	4.681E+02	2.188E+01	4.899E+02	2.811E+00	3.500E-06
1.274E+01	9.977E+01	4.072E+02	3.242E+01	4.396E+02	4.876E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	4.652E+01	4.486E+02	7.884E+00	6.000E-06
2.223E+01	1.000E+02	5.045E+02	6.303E+01	5.675E+02	1.346E+01	8.500E-06
3.146E+01	1.000E+02	6.620E+02	7.528E+01	7.372E+02	1.641E+01	1.250E-05
4.882E+01	1.000E+02	6.632E+02	7.381E+01	7.370E+02	2.158E+01	2.000E-05
6.630E+01	1.000E+02	5.884E+03	2.927E+02	6.177E+03	2.871E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 32

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.065E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.368E+01 UM OUTLET SIGMAP = 3.852E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.1808	97.6762	7.888	2.3238	97.6714	7.883	2.3246
4.000E-07	1.530	0.253	4.7115	2.9205	95.0987	6.323	4.9013	95.0927	6.320	4.9073
7.000E-07	1.297	0.903	17.8491	11.0875	94.7976	6.198	5.2024	94.7803	6.191	5.2197
1.100E-06	1.188	0.815	12.9822	8.1417	95.8076	6.650	4.1924	95.7532	6.623	4.2468
1.600E-06	1.130	1.520	18.0331	11.4796	96.8775	7.268	3.1225	96.7894	7.210	3.2106
2.500E-06	1.083	3.524	26.0236	17.2775	98.0564	8.262	1.9436	97.9158	8.116	2.0842
3.500E-06	1.059	1.652	8.3261	6.2262	98.6735	9.063	1.3265	98.3978	8.667	1.6022
4.500E-06	1.046	1.652	6.3882	5.8136	98.9823	9.619	1.0177	98.5040	8.811	1.4960
6.000E-06	1.035	1.982	3.0611	4.9002	99.5935	11.543	0.4065	98.9490	9.551	1.0510
8.500E-06	1.024	3.304	1.6599	6.1591	99.8678	13.498	0.1322	99.2075	10.143	0.7925
1.250E-05	1.017	4.846	0.6293	6.6438	99.9658	16.735	0.0342	99.4172	10.788	0.5828
2.000E-05	1.010	12.115	0.0192	8.2252	99.9996	48.821	0.0004	99.7114	12.261	0.2886
2.750E-05	1.008	67.401	0.0254	10.9442	99.9999	66.304	0.0001	99.9310	15.261	0.0690

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 4.120E+00
CORRECTED SIGMAP OF EFFLUENT = 3.204E+00
LOG-NORMAL GOODNESS OF FIT = 0.971
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,142E-01	2,359E-04	1,144E-01	9,779E-04	2,000E-07
3,486E+00	8,104E+01	3,971E+00	4,828E-03	3,976E+00	9,305E-03	4,000E-07
3,918E+00	8,457E+01	1,308E+01	4,356E-02	1,312E+01	9,659E-02	7,000E-07
4,769E+00	8,972E+01	1,520E+01	1,971E-01	1,540E+01	2,734E-01	1,100E-06
5,911E+00	9,404E+01	2,046E+01	5,773E-01	2,104E+01	8,265E-01	1,600E-06
8,019E+00	9,782E+01	2,289E+01	1,656E+00	2,454E+01	3,089E+00	2,500E-06
1,037E+01	9,929E+01	1,562E+01	3,245E+00	1,886E+01	2,811E+00	3,500E-06
1,274E+01	9,977E+01	1,025E+01	4,818E+00	1,507E+01	4,876E+00	4,500E-06
1,630E+01	9,996E+01	4,360E+00	6,914E+00	1,127E+01	7,884E+00	6,000E-06
2,223E+01	1,000E+02	1,876E+00	9,366E+00	1,124E+01	1,346E+01	8,500E-06
3,146E+01	1,000E+02	6,968E-01	1,119E+01	1,188E+01	1,641E+01	1,250E-05
4,882E+01	1,000E+02	1,587E-02	1,097E+01	1,098E+01	2,158E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	4,349E+01	4,356E+01	2,871E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 33

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 3.122E+00
OUTLET MMD = 4.120E+00 UM OUTLET SIGMAP = 3.204E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.1656	96.1885	6.850	3.8115	96.1814	6.846	3.8186
4.000E-07	1.530	0.253	3.4620	2.3908	92.8186	5.522	7.1814	92.8099	5.519	7.1901
7.000E-07	1.297	0.903	13.2808	9.1903	92.2814	5.371	7.7186	92.2561	5.364	7.7439
1.100E-06	1.188	0.815	10.3039	7.1920	93.3648	5.688	6.6352	93.2855	5.663	6.7145
1.600E-06	1.130	1.520	15.5806	11.0035	94.6205	6.128	5.3795	94.4919	6.078	5.5081
2.500E-06	1.083	3.524	25.9676	18.8616	96.1328	6.820	3.8672	95.9275	6.711	4.0725
3.500E-06	1.059	1.652	9.5269	7.0047	96.9735	7.334	3.0265	96.5711	7.072	3.4289
4.500E-06	1.046	1.652	8.2266	7.1897	97.3866	7.641	2.6134	96.6885	7.145	3.3115
6.000E-06	1.035	1.982	5.3236	6.1223	98.5904	8.936	1.4096	97.6497	7.864	2.3503
8.500E-06	1.024	3.304	4.5539	7.3254	99.2766	10.335	0.7234	98.3130	8.559	1.6870
1.250E-05	1.017	4.846	3.1180	7.2505	99.6623	11.932	0.3377	98.8616	9.384	1.1384
2.000E-05	1.010	12.115	0.3371	6.9397	99.9854	18.517	0.0146	99.5642	11.397	0.4358
2.750E-05	1.008	67.401	0.0794	8.9240	99.9994	66.304	0.0006	99.8993	14.468	0.1007

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE ORTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 4.103E+00
CORRECTED SIGMAP OF EFFLUENT = 2.993E+00
LOG-NORMAL GOODNESS OF FIT = 0.981
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	3.444E-04	1.876E-01	9.779E-04	2.000E-07
3.486E+00	8.104E+01	5.819E+00	7.047E-03	5.826E+00	9.305E-03	4.000E-07
3.918E+00	8.457E+01	1.940E+01	6.358E-02	1.946E+01	9.659E-02	7.000E-07
4.769E+00	8.972E+01	2.406E+01	2.876E-01	2.435E+01	2.734E-01	1.100E-06
5.911E+00	9.404E+01	3.525E+01	8.426E-01	3.609E+01	8.265E-01	1.600E-06
8.019E+00	9.782E+01	4.554E+01	2.417E+00	4.796E+01	3.059E+00	2.500E-06
1.037E+01	9.929E+01	3.563E+01	4.737E+00	4.037E+01	2.811E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	7.032E+00	3.336E+01	4.876E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	1.009E+01	2.521E+01	7.884E+00	6.000E-06
2.223E+01	1.000E+02	1.026E+01	1.367E+01	2.393E+01	1.346E+01	8.500E-06
3.146E+01	1.000E+02	6.885E+00	1.633E+01	2.321E+01	1.441E+01	1.250E-05
4.882E+01	1.000E+02	5.550E-01	1.601E+01	1.656E+01	2.158E+01	2.000E-05
6.630E+01	1.000E+02	3.894E-01	6.348E+01	6.387E+01	2.871E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 34

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.103E+00 UM OUTLET SIGMAP = 2.993E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40
RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.1569	94.3710	6.033	5.6290	94.3618	6.029	5.6382
4.000E-07	1.530	0.253	2.8175	2.0820	90.2545	4.882	9.7455	90.2431	4.879	9.7569
7.000E-07	1.297	0.903	10.8492	8.0329	89.4860	4.723	10.5140	89.4528	4.716	10.5472
1.100E-06	1.188	0.815	8.7455	6.5265	90.6096	4.960	9.3904	90.5054	4.937	9.4946
1.600E-06	1.130	1.520	13.8731	10.4560	92.0129	5.299	7.9871	91.8440	5.255	8.1560
2.500E-06	1.083	3.524	24.9052	19.1833	93.8154	5.835	6.1846	93.5458	5.746	6.4542
3.500E-06	1.059	1.652	9.7131	7.9052	94.8548	6.221	5.1452	94.3264	6.016	5.6736
4.500E-06	1.046	1.652	8.7730	7.7524	95.3527	6.434	4.6473	94.4361	6.057	5.5639
6.000E-06	1.035	1.982	6.4826	6.8496	97.1378	7.451	2.8622	95.9025	6.698	4.0975
8.500E-06	1.024	3.304	6.5732	8.3777	98.2590	8.493	1.7410	96.9937	7.348	3.0063
1.250E-05	1.017	4.846	5.5095	8.3641	99.0051	9.666	0.9949	97.9536	8.154	2.0464
2.000E-05	1.010	12.115	1.0816	6.4503	99.9219	15.001	0.0781	99.3687	10.620	0.6313
2.750E-05	1.008	67.401	0.4642	7.8629	99.9940	20.373	0.0060	99.8617	13.503	0.1383

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4. E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 2.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 4.184E+00
CORRECTED SIGMAP OF EFFLUENT = 2.899E+00
LOG-NORMAL GOODNESS OF FIT = 0.987
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	2,766E-01	4,522E-04	2,771E-01	9,779E-04	2,000E-07
3,486E+00	8,104E+01	7,896E+00	9,254E-03	7,905E+00	9,305E-03	4,000E-07
3,918E+00	8,457E+01	2,642E+01	8,348E-02	2,651E+01	9,659E-02	7,000E-07
4,769E+00	8,972E+01	3,405E+01	3,777E-01	3,443E+01	2,734E-01	1,100E-06
5,911E+00	9,404E+01	5,234E+01	1,106E+00	5,344E+01	8,265E-01	1,600E-06
8,019E+00	9,782E+01	7,283E+01	3,174E+00	7,601E+01	3,059E+00	2,500E-06
1,037E+01	9,929E+01	6,057E+01	6,220E+00	6,679E+01	2,811E+00	3,500E-06
1,274E+01	9,977E+01	4,682E+01	9,234E+00	5,605E+01	4,876E+00	4,500E-06
1,630E+01	9,996E+01	3,070E+01	1,325E+01	4,395E+01	7,884E+00	6,000E-06
2,223E+01	1,000E+02	2,470E+01	1,795E+01	4,265E+01	1,346E+01	8,500E-06
3,146E+01	1,000E+02	2,029E+01	2,144E+01	4,172E+01	1,641E+01	1,250E-05
4,882E+01	1,000E+02	2,969E+00	2,102E+01	2,399E+01	2,154E+01	2,000E-05
6,630E+01	1,000E+02	3,798E+00	8,336E+01	8,715E+01	2,871E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 35

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.184E+00 UM OUTLET SIGMAP = 2.899E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60
RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.1491	91.8187	5.249	8.1813	91.8069	5.246	8.1931
4.000E-07	1.530	0.253	2.3418	1.8297	86.9043	4.262	13.0957	86.8896	4.260	13.1104
7.000E-07	1.297	0.903	9.0162	7.0580	85.8735	4.103	14.1265	85.8309	4.097	14.1691
1.100E-06	1.188	0.815	7.4873	5.9035	87.0024	4.278	12.9976	86.8689	4.257	13.1311
1.600E-06	1.130	1.520	12.3234	9.7994	88.5295	4.540	11.4705	88.3131	4.501	11.6869
2.500E-06	1.083	3.524	23.3765	18.9159	90.6149	4.961	9.3851	90.2694	4.885	9.7306
3.500E-06	1.059	1.652	9.5059	8.0361	91.8589	5.259	8.1411	91.1818	5.091	8.8182
4.500E-06	1.046	1.652	8.8244	7.9576	92.4426	5.415	7.5574	91.2679	5.112	8.7321
6.000E-06	1.035	1.982	7.1634	7.3216	94.8866	6.234	5.1134	93.3035	5.669	6.6965
8.500E-06	1.024	3.304	8.1009	9.2781	96.5311	7.048	3.4689	94.9094	6.243	5.0906
1.250E-05	1.017	4.846	7.6993	9.6113	97.7522	7.957	2.2478	96.4046	6.973	3.5954
2.000E-05	1.010	12.115	2.3700	6.5873	99.7232	12.349	0.2768	99.0143	9.686	0.9857
2.750E-05	1.008	67.401	1.6000	7.5523	99.9664	16.771	0.0336	99.7969	12.998	0.2031

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 15.00
RSIGMA = 2.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 4.376E+00
CORRECTED SIGMAP OF EFFLUENT = 2.863E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	5.795E-04	4.026E-01	9.779E-04	2.000E-07
3.486E+00	8.104E+01	1.061E+01	1.186E-02	1.062E+01	9.305E-03	4.000E-07
3.918E+00	8.457E+01	3.550E+01	1.070E-01	3.561E+01	9.659E-02	7.000E-07
4.769E+00	8.972E+01	4.713E+01	4.840E-01	4.761E+01	2.734E-01	1.100E-06
5.911E+00	9.404E+01	7.516E+01	1.418E+00	7.658E+01	8.265E-01	1.600E-06
8.019E+00	9.782E+01	1.105E+02	4.068E+00	1.146E+02	3.059E+00	2.500E-06
1.037E+01	9.929E+01	9.584E+01	7.971E+00	1.038E+02	2.811E+00	3.500E-06
1.274E+01	9.977E+01	7.614E+01	1.183E+01	8.797E+01	4.876E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	1.698E+01	7.183E+01	7.884E+00	6.000E-06
2.223E+01	1.000E+02	4.921E+01	2.301E+01	7.222E+01	1.346E+01	8.500E-06
3.146E+01	1.000E+02	4.583E+01	2.748E+01	7.331E+01	1.641E+01	1.250E-05
4.882E+01	1.000E+02	1.052E+01	2.694E+01	3.746E+01	2.158E+01	2.000E-05
6.630E+01	1.000E+02	2.116E+01	1.068E+02	1.280E+02	2.871E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 36

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.376E+00 UM OUTLET SIGMAP = 2.843E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 1.500E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.3449	0.1842	98.7634	9.210	1.2366	98.7627	9.209	1.2373
4.000E-07	1.530	0.253	6.4038	3.4196	97.0053	7.356	2.9947	97.0042	7.355	2.9958
7.000E-07	1.297	0.903	24.0564	12.8568	96.8480	7.249	3.1520	96.8443	7.246	3.1557
1.100E-06	1.188	0.815	16.2242	8.7105	97.6447	7.859	2.3553	97.6311	7.847	2.3689
1.600E-06	1.130	1.520	20.1366	10.9205	98.4326	8.713	1.5674	98.4076	8.688	1.5924
2.500E-06	1.083	3.524	23.1421	13.0926	99.2230	10.185	0.7770	99.1765	10.063	0.8235
3.500E-06	1.059	1.652	5.6379	3.7682	99.5962	11.557	0.4038	99.4944	11.086	0.5056
4.500E-06	1.046	1.652	3.2086	3.1467	99.7702	12.739	0.2298	99.5778	11.464	0.4222
6.000E-06	1.035	1.982	0.7054	2.9331	99.9579	16.297	0.0421	99.6720	11.993	0.3280
8.500E-06	1.024	3.304	0.0695	4.9462	99.9975	22.227	0.0025	99.6682	11.969	0.3318
1.250E-05	1.017	4.846	0.0041	6.8150	99.9999	31.459	0.0001	99.6883	12.100	0.3117
2.000E-05	1.010	12.115	0.0102	10.4455	99.9999	48.821	0.0001	99.8089	13.126	0.1911
2.750E-05	1.008	67.401	0.0565	18.7619	99.9999	66.304	0.0001	99.9383	15.496	0.0617

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 4.947E+00
CORRECTED SIGMAP OF EFFLUENT = 3.813E+00
LOG-NORMAL GOODNESS OF FIT = 0.944
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	6.077E-02	3.518E-05	6.080E-02	2.285E-04	2.000E-07
3.486E+00	8.104E+01	2.426E+00	8.642E-04	2.427E+00	2.609E-03	4.000E-07
3.918E+00	8.457E+01	7.922E+00	9.449E-03	7.931E+00	3.283E-02	7.000E-07
4.769E+00	8.972E+01	8.540E+00	4.923E-02	8.589E+00	1.070E-01	1.100E-06
5.911E+00	9.404E+01	1.027E+01	1.638E-01	1.043E+01	3.674E-01	1.600E-06
8.019E+00	9.782E+01	9.150E+00	5.475E-01	9.697E+00	1.584E+00	2.500E-06
1.037E+01	9.929E+01	4.753E+00	1.198E+00	5.952E+00	1.626E+00	3.500E-06
1.274E+01	9.977E+01	2.315E+00	1.938E+00	4.253E+00	3.073E+00	4.500E-06
1.630E+01	9.996E+01	4.517E-01	3.067E+00	3.518E+00	5.479E+00	6.000E-06
2.223E+01	1.000E+02	3.531E-02	4.672E+00	4.707E+00	1.052E+01	8.500E-06
3.146E+01	1.000E+02	2.022E-03	6.355E+00	6.357E+00	1.461E+01	1.250E-05
4.882E+01	1.000E+02	3.769E-03	7.263E+00	7.266E+00	2.239E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	3.888E+01	3.894E+01	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 37

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.987E+00 UM OUTLET SIGMAP = 3.813E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAB = 0.00
RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.1725	97.1023	7.425	2.8977	97.1010	7.424	2.8990
4.000E-07	1.530	0.253	4.0629	2.6498	94.1940	5.968	5.8060	94.1920	5.967	5.8080
7.000E-07	1.297	0.903	15.5003	10.1172	93.7940	5.828	6.2060	93.7870	5.826	6.2130
1.100E-06	1.188	0.815	11.6397	7.6260	94.8365	6.214	5.1635	94.8112	6.203	5.1888
1.600E-06	1.130	1.520	16.8762	11.1307	95.9859	6.742	4.0141	95.9392	6.717	4.0608
2.500E-06	1.083	3.524	26.2590	17.6716	97.3060	7.578	2.6940	97.2192	7.511	2.7808
3.500E-06	1.059	1.652	9.0557	6.4701	98.0181	8.221	1.9819	97.8281	8.029	2.1719
4.500E-06	1.046	1.652	7.4341	5.9168	98.3730	8.635	1.6270	98.0138	8.217	1.9862
6.000E-06	1.035	1.982	4.2085	4.6515	99.2323	10.210	0.7677	98.6986	9.103	1.3014
8.500E-06	1.024	3.304	2.9758	5.6033	99.6744	12.008	0.3256	99.0595	9.784	0.9405
1.250E-05	1.017	4.846	1.6067	6.1324	99.8801	14.103	0.1199	99.2983	10.398	0.7017
2.000E-05	1.010	12.115	0.0981	7.8584	99.9971	21.887	0.0029	99.6403	11.799	0.3597
2.750E-05	1.008	67.401	0.0185	13.9998	99.9999	66.304	0.0001	99.8848	14.187	0.1152

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.463E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 6.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 4.448E+00
CORRECTED SIGMAP OF EFFLUENT = 3.284E+00
LOG-NORMAL GOODNESS OF FIT = 0.968
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	6.568E-05	1.425E-01	2.285E-04	2.000E-07
3.486E+00	8.104E+01	4.704E+00	1.613E-03	4.706E+00	2.609E-03	4.000E-07
3.918E+00	8.457E+01	1.560E+01	1.764E-02	1.562E+01	3.283E-02	7.000E-07
4.769E+00	8.972E+01	1.872E+01	9.192E-02	1.881E+01	1.070E-01	1.100E-06
5.911E+00	9.404E+01	2.630E+01	3.058E-01	2.661E+01	3.674E-01	1.600E-06
8.019E+00	9.782E+01	3.173E+01	1.022E+00	3.275E+01	1.584E+00	2.500E-06
1.037E+01	9.929E+01	2.333E+01	2.237E+00	2.557E+01	1.626E+00	3.500E-06
1.274E+01	9.977E+01	1.639E+01	3.618E+00	2.001E+01	3.073E+00	4.500E-06
1.630E+01	9.996E+01	8.235E+00	5.725E+00	1.396E+01	5.479E+00	6.000E-06
2.223E+01	1.000E+02	4.619E+00	8.722E+00	1.334E+01	1.052E+01	8.500E-06
3.146E+01	1.000E+02	2.444E+00	1.186E+01	1.431E+01	1.461E+01	1.250E-05
4.882E+01	1.000E+02	1.113E+01	1.356E+01	1.367E+01	2.239E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	7.258E+01	7.264E+01	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 38

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 7.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.448E+00 UM OUTLET SIGMAP = 3.284E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.1836	0.1421	92.7505	5.502	7.2495	92.7478	5.501	7.2522
4.000E-07	1.530	0.253	2.3354	1.8069	87.9714	4.441	12.0286	87.9675	4.440	12.0325
7.000E-07	1.297	0.903	8.8651	6.8642	87.2072	4.311	12.7928	87.1933	4.309	12.8067
1.100E-06	1.188	0.815	7.1634	5.5648	88.5468	4.543	11.4532	88.4967	4.534	11.5033
1.600E-06	1.130	1.520	11.5362	9.0060	90.1102	4.851	9.8898	90.0180	4.832	9.9820
2.500E-06	1.083	3.524	21.6945	17.1386	91.9780	5.290	8.0220	91.8065	5.246	8.1935
3.500E-06	1.059	1.652	9.0002	7.3296	92.9008	5.546	7.0992	92.5252	5.438	7.4748
4.500E-06	1.046	1.652	8.6513	7.3876	93.1761	5.629	6.8239	92.4660	5.421	7.5340
6.000E-06	1.035	1.482	7.3927	6.9593	95.1397	6.341	4.8603	94.0845	5.929	5.9155
8.500E-06	1.024	3.304	9.1127	9.4319	96.4060	6.973	3.5940	95.1906	6.363	4.8094
1.250E-05	1.017	4.846	9.0758	10.3284	97.5596	7.785	2.4404	96.4093	6.975	3.5907
2.000E-05	1.010	12.115	2.9234	7.3330	99.6856	12.081	0.3144	98.9803	9.615	1.0197
2.750E-05	1.008	67.401	2.0658	10.7075	99.9601	16.408	0.0399	99.7324	12.419	0.2676

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 4.897E+00
CORRECTED SIGMAP OF EFFLUENT = 3.018E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	3,542E-01	1,298E-04	3.564E-01	2,285E-04	2,000E-07
3,486E+00	8,104E+01	9,746E+00	3,189E-03	9.749E+00	2,609E-03	4,000E-07
3,918E+00	8,457E+01	3,215E+01	3,487E-02	3,219E+01	3,283E-02	7,000E-07
4,769E+00	8,972E+01	4,153E+01	1,817E-01	4,171E+01	1,070E-01	1,100E-06
5,911E+00	9,404E+01	6,480E+01	6,045E-01	6,541E+01	3,674E-01	1,600E-06
8,019E+00	9,782E+01	9,447E+01	2,021E+00	9,649E+01	1,584E+00	2,500E-06
1,037E+01	9,929E+01	8,357E+01	4,422E+00	8,799E+01	1,626E+00	3,500E-06
1,274E+01	9,977E+01	6,875E+01	7,153E+00	7,590E+01	3,073E+00	4,500E-06
1,630E+01	9,996E+01	5,213E+01	1,132E+01	6,345E+01	5,479E+00	6,000E-06
2,223E+01	1,000E+02	5,098E+01	1,724E+01	6,823E+01	1,052E+01	8,500E-06
3,146E+01	1,000E+02	4,976E+01	2,345E+01	7,321E+01	1,461E+01	1,250E-05
4,882E+01	1,000E+02	1,195E+01	2,680E+01	3,875E+01	2,239E+01	2,000E-05
6,630E+01	1,000E+02	2,517E+01	1,435E+02	1,686E+02	4,021E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 30

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.897E+00 UM OUTLET SIGMAP = 3.018E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.1053	83.3481	3.759	16.6519	83.3433	3.758	16.6567
4.000E-07	1.530	0.253	1.3078	1.1347	76.5857	3.044	23.4143	76.5786	3.043	23.4214
7.000E-07	1.297	0.903	4.9032	4.2574	75.4048	2.941	24.5952	75.3796	2.939	24.6204
1.100E-06	1.188	0.815	4.1624	3.6247	76.8663	3.069	23.1337	76.7754	3.061	23.2246
1.600E-06	1.130	1.520	7.1693	6.2674	78.6357	3.236	21.3643	78.4684	3.220	21.5316
2.500E-06	1.083	3.524	14.9949	13.2168	80.7263	3.452	19.2737	80.4150	3.418	19.5850
3.500E-06	1.059	1.652	6.7415	6.0632	81.5156	3.540	18.4844	80.8341	3.464	19.1659
4.500E-06	1.046	1.652	6.7972	6.3034	81.3630	3.522	18.6370	80.0749	3.382	19.9251
6.000E-06	1.035	1.982	6.8997	6.7114	84.2318	3.873	15.7682	82.3176	3.633	17.6824
8.500E-06	1.024	3.304	10.1042	10.1596	86.1477	4.145	13.8523	83.9428	3.835	16.0572
1.250E-05	1.017	4.846	12.2164	12.5331	88.5813	4.550	11.4187	86.4945	4.198	13.5055
2.000E-05	1.010	12.115	9.2214	10.9672	96.5523	7.061	3.4477	95.2728	4.399	4.7272
2.750E-05	1.008	67.401	15.3608	18.6558	98.9677	9.589	1.0323	98.5546	8.883	1.4454

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 94.7780
CORRECTED MMD OF EFFLUENT = 7.211E+00
CORRECTED SIGMAP OF EFFLUENT = 3.262E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E-01	2.355E-04	8.185E-01	2.285E-04	2.000E-07
3.486E+00	8.104E+01	1.897E+01	5.786E-03	1.898E+01	2.609E-03	4.000E-07
3.918E+00	8.457E+01	6.181E+01	6.327E-02	6.188E+01	3.283E-02	7.000E-07
4.769E+00	8.972E+01	8.388E+01	3.296E-01	8.421E+01	1.070E-01	1.100E-06
5.911E+00	9.404E+01	1.400E+02	1.097E+00	1.411E+02	3.674E-01	1.600E-06
8.019E+00	9.782E+01	2.270E+02	3.666E+00	2.306E+02	1.584E+00	2.500E-06
1.037E+01	9.929E+01	2.176E+02	8.023E+00	2.256E+02	1.626E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	1.298E+01	2.007E+02	3.073E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	2.053E+01	1.897E+02	5.479E+00	6.000E-06
2.223E+01	1.000E+02	1.965E+02	3.128E+01	2.278E+02	1.052E+01	8.500E-06
3.146E+01	1.000E+02	2.328E+02	4.255E+01	2.754E+02	1.461E+01	1.250E-05
4.882E+01	1.000E+02	1.310E+02	4.863E+01	1.797E+02	2.239E+01	2.000E-05
6.630E+01	1.000E+02	6.505E+02	2.603E+02	9.108E+02	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 40

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 7.211E+00 UM OUTLET SIGMAP = 3.262E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP N	NO-RAP P	COR. EFF.	COR. N	COR. P
2.000E-07	2.123	0.033	0.0728	0.0682	64.3675	2.164	35.6325	64.3600	2.163	35.6400
4.000E-07	1.530	0.253	0.6774	0.6347	56.7538	1.758	43.2462	56.7425	1.757	43.2575
7.000E-07	1.297	0.903	2.4961	2.3404	55.3530	1.691	44.6470	55.3133	1.689	44.6867
1.100E-06	1.188	0.815	2.1898	2.0581	56.6033	1.750	43.3967	56.4602	1.743	43.5398
1.600E-06	1.130	1.520	3.9380	3.7122	58.1548	1.827	41.8452	57.8913	1.813	42.1087
2.500E-06	1.083	3.524	8.7495	8.2963	59.8988	1.916	40.1012	59.4086	1.890	40.5914
3.500E-06	1.059	1.652	4.0669	3.9125	60.2386	1.934	39.7614	59.1653	1.878	40.8347
4.500E-06	1.046	1.652	4.1342	4.0671	59.5802	1.899	40.4198	57.5517	1.797	42.4483
6.000E-06	1.035	1.982	4.5999	4.6555	62.5155	2.057	37.4845	59.5010	1.895	40.4990
8.500E-06	1.028	3.304	7.2745	7.4798	64.4392	2.168	35.5608	60.9668	1.972	39.0332
1.250E-05	1.017	4.846	9.7411	10.0487	67.5336	2.359	32.4664	64.2473	2.157	35.7527
2.000E-05	1.010	12.115	13.0892	13.6773	82.5497	3.660	17.4503	80.5347	3.431	19.4653
2.750E-05	1.008	67.401	38.9707	39.0492	90.6614	4.971	9.3386	90.0108	4.830	9.9892

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.399E+01
CORRECTED SIGMAP OF EFFLUENT = 3.889E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,751E+00	3,709E-04	1,751E+00	2,285E-04	2,000E-07
3,486E+00	8,104E+01	3,504E+01	9,112E-03	3,505E+01	2,609E-03	4,000E-07
3,918E+00	8,457E+01	1,122E+02	9,963E-02	1,123E+02	3,283E-02	7,000E-07
4,769E+00	8,972E+01	1,573E+02	5,191E-01	1,579E+02	1,070E-01	1,100E-06
5,911E+00	9,404E+01	2,742E+02	1,727E+00	2,759E+02	3,674E-01	1,600E-06
8,019E+00	9,782E+01	4,722E+02	5,773E+00	4,780E+02	1,584E+00	2,500E-06
1,037E+01	9,929E+01	4,681E+02	1,263E+01	4,807E+02	1,626E+00	3,500E-06
1,274E+01	9,977E+01	4,072E+02	2,044E+01	4,276E+02	3,073E+00	4,500E-06
1,630E+01	9,996E+01	4,021E+02	3,234E+01	4,344E+02	5,479E+00	6,000E-06
2,223E+01	1,000E+02	5,045E+02	4,926E+01	5,537E+02	1,052E+01	8,500E-06
3,146E+01	1,000E+02	6,620E+02	6,700E+01	7,290E+02	1,461E+01	1,250E-05
4,882E+01	1,000E+02	6,632E+02	7,658E+01	7,398E+02	2,239E+01	2,000E-05
6,630E+01	1,000E+02	5,884E+03	4,099E+02	6,294E+03	4,021E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 41

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.399E+01 UM OUTLET SIGMAP = 3.889E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.1805	97.6762	7.888	2.3238	97.6751	7.887	2.3249
4.000E-07	1.530	0.253	4.7115	2.9180	95.0987	6.323	4.9013	95.0970	6.322	4.9030
7.000E-07	1.297	0.903	17.8491	11.0632	94.7976	6.198	5.2024	94.7917	6.196	5.2083
1.100E-06	1.188	0.815	12.9822	8.0783	95.8076	6.650	4.1924	95.7863	6.640	4.2137
1.600E-06	1.130	1.520	18.0331	11.3046	96.8775	7.268	3.1225	96.8384	7.242	3.1616
2.500E-06	1.083	3.524	26.0236	16.7155	98.0564	8.262	1.9436	97.9836	8.185	2.0164
3.500E-06	1.059	1.652	8.3261	5.7746	98.6735	9.063	1.3265	98.5140	8.825	1.4860
4.500E-06	1.046	1.652	6.3882	5.1265	98.9823	9.619	1.0177	98.6808	9.075	1.3192
6.000E-06	1.035	1.982	3.0611	3.9837	99.5935	11.543	0.4065	99.1456	9.985	0.8544
8.500E-06	1.024	3.304	1.6599	5.0381	99.8678	13.498	0.1322	99.3518	10.565	0.6482
1.250E-05	1.017	4.846	0.6293	5.9565	99.9658	16.735	0.0342	99.4775	11.017	0.5225
2.000E-05	1.010	12.115	0.0192	8.5334	99.9996	48.821	0.0004	99.7006	12.184	0.2994
2.750E-05	1.008	67.401	0.0254	15.3270	99.9999	66.304	0.0001	99.9033	14.554	0.0967

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 4.499E+00
CORRECTED SIGMAP OF EFFLUENT = 3.421E+00
LOG-NORMAL GOODNESS OF FIT = 0.961
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.142E-01	5.512E-05	1.142E-01	2.285E-04	2.000E-07
3.486E+00	8.104E+01	3.971E+00	1.354E-03	3.973E+00	2.609E-03	4.000E-07
3.918E+00	8.457E+01	1.308E+01	1.481E-02	1.309E+01	3.283E-02	7.000E-07
4.769E+00	8.972E+01	1.520E+01	7.714E-02	1.528E+01	1.070E-01	1.100E-06
5.911E+00	9.404E+01	2.046E+01	2.566E-01	2.072E+01	3.674E-01	1.600E-06
8.019E+00	9.782E+01	2.289E+01	8.578E-01	2.375E+01	1.584E+00	2.500E-06
1.037E+01	9.929E+01	1.562E+01	1.878E+00	1.749E+01	1.626E+00	3.500E-06
1.274E+01	9.977E+01	1.025E+01	3.037E+00	1.329E+01	3.073E+00	4.500E-06
1.630E+01	9.996E+01	4.360E+00	4.805E+00	9.165E+00	5.479E+00	6.000E-06
2.223E+01	1.000E+02	1.876E+00	7.320E+00	9.196E+00	1.052E+01	8.500E-06
3.146E+01	1.000E+02	6.968E-01	9.957E+00	1.065E+01	1.461E+01	1.250E-05
4.882E+01	1.000E+02	1.587E-02	1.138E+01	1.140E+01	2.239E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	6.091E+01	6.098E+01	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 42

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.499E+00 UM OUTLET SIGMAP = 3.421E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET % COR.	OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.1654	96.1885	6.850	3.8115	96.1868	6.849	3.8132
4.000E-07	1.530	0.253	3.4620	2.3887	92.8186	5.522	7.1814	92.8162	5.521	7.1838
7.000E-07	1.297	0.903	13.2808	9.1705	92.2814	5.371	7.7186	92.2728	5.368	7.7272
1.100E-06	1.188	0.815	10.3039	7.1403	93.3648	5.688	6.6352	93.3338	5.678	6.6662
1.600E-06	1.130	1.520	15.5806	10.8607	94.6205	6.128	5.3795	94.3633	6.106	5.4367
2.500E-06	1.083	3.524	25.9676	18.4033	96.1328	6.820	3.8672	96.0264	6.763	3.9736
3.500E-06	1.059	1.652	9.5269	7.0765	96.9735	7.334	3.0265	96.7407	7.178	3.2593
4.500E-06	1.046	1.652	8.2266	6.6294	97.3866	7.641	2.6134	96.9466	7.315	3.0534
6.000E-06	1.035	1.982	5.3236	5.3750	98.5904	8.936	1.4096	97.9366	8.137	2.0634
8.500E-06	1.024	3.304	4.5539	6.4112	99.2766	10.335	0.7234	98.5235	8.839	1.4765
1.250E-05	1.017	4.846	3.1180	6.6900	99.6623	11.932	0.3377	98.9496	9.552	1.0504
2.000E-05	1.010	12.115	0.3371	7.1909	99.9854	18.517	0.0146	99.5484	11.322	0.4516
2.750E-05	1.008	67.401	0.0794	12.4981	99.9994	66.304	0.0006	99.8589	13.762	0.1411

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 4.415E+00
CORRECTED SIGMAP OF EFFLUENT = 3.155E+00
LOG-NORMAL GOODNESS OF FIT = 0.975
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,873E-01	8,045E-05	1,874E-01	2,285E-04	2,000E-07
3,486E+00	8,104E+01	5,819E+00	1,976E-03	5,821E+00	2,609E-03	4,000E-07
3,918E+00	8,457E+01	1,940E+01	2,161E-02	1,942E+01	3,283E-02	7,000E-07
4,769E+00	8,972E+01	2,406E+01	1,126E-01	2,417E+01	1,070E-01	1,100E-06
5,911E+00	9,404E+01	3,525E+01	3,746E-01	3,562E+01	3,674E-01	1,600E-06
8,019E+00	9,782E+01	4,554E+01	1,252E+00	4,679E+01	1,584E+00	2,500E-06
1,037E+01	9,929E+01	3,563E+01	2,740E+00	3,837E+01	1,626E+00	3,500E-06
1,274E+01	9,977E+01	2,633E+01	4,432E+00	3,076E+01	3,073E+00	4,500E-06
1,630E+01	9,996E+01	1,512E+01	7,013E+00	2,213E+01	5,479E+00	6,000E-06
2,223E+01	1,000E+02	1,026E+01	1,068E+01	2,095E+01	1,052E+01	8,500E-06
3,146E+01	1,000E+02	6,885E+00	1,453E+01	2,142E+01	1,461E+01	1,250E-05
4,882E+01	1,000E+02	5,550E-01	1,661E+01	1,716E+01	2,239E+01	2,000E-05
6,630E+01	1,000E+02	3,894E-01	8,890E+01	8,929E+01	4,021E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 43

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 4.415E+00 UM OUTLET SIGMAP = 3.155E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40
RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.1567	94.3710	6.033	5.6290	94.3688	6.032	5.6312
4.000E-07	1.530	0.253	2.8175	2.0802	90.2545	4.882	9.7455	90.2513	4.881	9.7487
7.000E-07	1.297	0.903	10.8492	8.0162	89.4860	4.723	10.5140	89.4747	4.720	10.5253
1.100E-06	1.188	0.815	8.7455	6.4829	90.6096	4.960	9.3904	90.5688	4.951	9.4312
1.600E-06	1.130	1.520	13.8731	10.3358	92.0129	5.299	7.9871	91.9378	5.279	8.0622
2.500E-06	1.083	3.524	24.9052	18.7971	93.8154	5.835	6.1846	93.6758	5.788	6.3242
3.500E-06	1.059	1.652	9.7131	7.5949	94.8548	6.221	5.1452	94.5491	6.100	5.4509
4.500E-06	1.046	1.652	8.7730	7.2802	95.3527	6.434	4.6473	94.7750	6.189	5.2250
6.000E-06	1.035	1.982	6.4826	6.2199	97.1378	7.451	2.8622	96.2793	6.901	3.7207
8.500E-06	1.024	3.304	6.5732	7.6074	98.2590	8.493	1.7410	97.2701	7.550	2.7299
1.250E-05	1.017	4.846	5.5095	7.8918	99.0051	9.666	0.9949	98.0692	8.276	1.9308
2.000E-05	1.010	12.115	1.0816	6.6621	99.9219	15.001	0.0781	99.3480	10.552	0.6520
2.750E-05	1.008	67.401	0.4642	10.8746	99.9940	20.373	0.0060	99.8087	13.123	0.1913

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 98.8148
CORRECTED MMD OF EFFLUENT = 4.460E+00
CORRECTED SIGMAP OF EFFLUENT = 3.031E+00
LOG-NORMAL GOODNESS OF FIT = 0.982
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	2.766E-01	1.056E-04	2.767E-01	2.285E-04	2.000E-07
3.486E+00	8.104E+01	7.896E+00	2.595E-03	7.899E+00	2.609E-03	4.000E-07
3.918E+00	8.457E+01	2.642E+01	2.837E-02	2.645E+01	3.283E-02	7.000E-07
4.769E+00	8.972E+01	3.405E+01	1.478E-01	3.420E+01	1.070E-01	1.100E-06
5.911E+00	9.404E+01	5.234E+01	4.918E-01	5.283E+01	3.674E-01	1.600E-06
8.019E+00	9.782E+01	7.283E+01	1.644E+00	7.448E+01	1.584E+00	2.500E-06
1.037E+01	9.929E+01	6.057E+01	3.59AE+00	6.417E+01	1.626E+00	3.500E-06
1.274E+01	9.977E+01	4.682E+01	5.820E+00	5.264E+01	3.073E+00	4.500E-06
1.630E+01	9.996E+01	3.070E+01	9.209E+00	3.991E+01	5.479E+00	6.000E-06
2.223E+01	1.000E+02	2.470E+01	1.403E+01	3.873E+01	1.052E+01	8.500E-06
3.146E+01	1.000E+02	2.029E+01	1.908E+01	3.937E+01	1.461E+01	1.250E-05
4.882E+01	1.000E+02	2.969E+00	2.181E+01	2.478E+01	2.239E+01	2.000E-05
6.630E+01	1.000E+02	3.798E+00	1.167E+02	1.205E+02	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 44

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.08 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.460E+00 UM OUTLET SIGMAP = 3.031E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60

RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.1490	91.8187	5.249	8.1813	91.8159	5.248	8.1841
4.000E-07	1.530	0.253	2.3418	1.8283	86.9043	4.262	13.0957	86.9002	4.262	13.0998
7.000E-07	1.297	0.903	9.0162	7.0440	85.8735	4.103	14.1265	85.8590	4.101	14.1410
1.100E-06	1.188	0.815	7.4873	5.8670	87.0024	4.278	12.9976	86.9502	4.270	13.0498
1.600E-06	1.130	1.520	12.3234	9.6986	88.5295	4.540	11.4705	88.4333	4.523	11.5667
2.500E-06	1.083	3.524	23.3765	18.5922	90.6149	4.961	9.3851	90.4359	4.921	9.5641
3.500E-06	1.059	1.652	9.5059	7.7760	91.8589	5.259	8.1411	91.4672	5.160	8.5328
4.500E-06	1.046	1.652	8.8244	7.5618	92.4426	5.415	7.5574	91.7022	5.219	8.2978
6.000E-06	1.035	1.982	7.1634	6.7937	94.8866	6.234	5.1134	93.7863	5.825	6.2137
8.500E-06	1.024	3.304	8.1009	8.6324	96.5311	7.048	3.4689	95.2637	6.395	4.7363
1.250E-05	1.017	4.846	7.6993	9.2154	97.7522	7.957	2.2478	96.5527	7.061	3.4473
2.000E-05	1.010	12.115	2.3700	6.7648	99.7232	12.349	0.2768	98.9878	9.630	1.0122
2.750E-05	1.008	67.401	1.6000	10.0768	99.9664	16.771	0.0336	99.7290	12.393	0.2710

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 20.00
RSIGMA = 2.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 4.623E+00
CORRECTED SIGMAP OF EFFLUENT = 2.970E+00
LOG-NORMAL GOODNESS OF FIT = 0.987
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	1.354E-04	4.022E-01	2.285E-04	2.000E-07
3.486E+00	8.104E+01	1.041E+01	3.326E-03	1.061E+01	2.609E-03	4.000E-07
3.918E+00	8.457E+01	3.550E+01	3.636E-02	3.554E+01	3.283E-02	7.000E-07
4.769E+00	8.972E+01	4.713E+01	1.895E-01	4.732E+01	1.070E-01	1.100E-06
5.911E+00	9.404E+01	7.516E+01	6.303E-01	7.579E+01	3.674E-01	1.600E-06
8.019E+00	9.782E+01	1.105E+02	2.107E+00	1.126E+02	1.584E+00	2.500E-06
1.037E+01	9.929E+01	9.584E+01	4.611E+00	1.004E+02	1.626E+00	3.500E-06
1.274E+01	9.977E+01	7.614E+01	7.459E+00	8.359E+01	3.073E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	1.180E+01	6.665E+01	5.479E+00	6.000E-06
2.223E+01	1.000E+02	4.921E+01	1.798E+01	6.719E+01	1.052E+01	8.500E-06
3.146E+01	1.000E+02	4.583E+01	2.446E+01	7.029E+01	1.461E+01	1.250E-05
4.882E+01	1.000E+02	1.052E+01	2.795E+01	3.847E+01	2.239E+01	2.000E-05
6.630E+01	1.000E+02	2.116E+01	1.496E+02	1.708E+02	4.021E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 45

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 8.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.623E+00 UM OUTLET SIGMAP = 2.970E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 2.000E+01 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.3449	0.1841	98.7634	9.210	1.2366	98.7634	9.210	1.2366
4.000E-07	1.530	0.253	6.4038	3.4184	97.0053	7.356	2.9947	97.0053	7.356	2.9947
7.000E-07	1.297	0.903	24.0564	12.8415	96.8480	7.249	3.1520	96.8480	7.249	3.1520
1.100E-06	1.188	0.815	16.2242	8.6606	97.6447	7.859	2.3553	97.6447	7.859	2.3553
1.600E-06	1.130	1.520	20.1366	10.7500	98.4326	8.713	1.5674	98.4325	8.713	1.5675
2.500E-06	1.083	3.524	23.1421	12.4428	99.2230	10.185	0.7770	99.2174	10.170	0.7826
3.500E-06	1.059	1.652	5.6379	3.3909	99.5962	11.557	0.4038	99.5451	11.307	0.4549
4.500E-06	1.046	1.652	3.2086	3.4988	99.7702	12.739	0.2298	99.5306	11.241	0.4694
6.000E-06	1.035	1.982	0.7054	6.5195	99.9579	16.297	0.0421	99.2709	10.318	0.7291
8.500E-06	1.024	3.304	0.0695	15.4210	99.9975	22.227	0.0025	98.9655	9.584	1.0345
1.250E-05	1.017	4.846	0.0041	15.2818	99.9999	31.459	0.0001	99.3011	10.407	0.6989
2.000E-05	1.010	12.115	0.0102	7.0483	99.9999	48.821	0.0001	99.8711	13.950	0.1289
2.750E-05	1.008	67.401	0.0565	0.5423	99.9999	66.304	0.0001	99.9982	22.926	0.0018

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISYRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 3.690E+00
CORRECTED SIGMAP OF EFFLUENT = 2.912E+00
LOG-NORMAL GOODNESS OF FIT = 0.973
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.340E+01	6.077E-02	4.046E-17	6.077E-02	2.627E-16	2.000E-07
3.486E+00	8.104E+01	2.426E+00	2.463E-12	2.426E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	7.922E+00	4.136E-08	7.922E+00	1.437E-07	7.000E-07
4.769E+00	8.972E+01	8.540E+00	1.111E-05	8.540E+00	2.415E-05	1.100E-06
5.911E+00	9.404E+01	1.027E+01	9.268E-04	1.027E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	9.150E+00	6.616E-02	9.216E+00	1.915E-01	2.500E-06
1.037E+01	9.929E+01	4.753E+00	6.023E-01	5.356E+00	8.173E-01	3.500E-06
1.274E+01	9.977E+01	2.315E+00	2.414E+00	4.729E+00	3.828E+00	4.500E-06
1.630E+01	9.996E+01	4.517E-01	7.369E+00	7.820E+00	1.317E+01	6.000E-06
2.223E+01	1.000E+02	3.531E-02	1.464E+01	1.468E+01	3.297E+01	8.500E-06
3.146E+01	1.000E+02	2.022E-03	1.425E+01	1.425E+01	3.275E+01	1.250E-05
4.882E+01	1.000E+02	3.769E-03	4.901E+00	4.904E+00	1.511E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	1.124E+00	1.187E+00	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 46

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.690E+00 UM OUTLET SIGMAP = 2.912E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.1724	97.1023	7.425	2.8977	97.1023	7.425	2.8977
4.000E-07	1.530	0.253	4.0629	2.6489	94.1940	5.968	5.8060	94.1940	5.968	5.8060
7.000E-07	1.297	0.903	15.5003	10.1057	93.7940	5.828	6.2060	93.7940	5.828	6.2060
1.100E-06	1.188	0.815	11.6397	7.5887	94.8365	6.214	5.1635	94.8365	6.214	5.1635
1.600E-06	1.130	1.520	16.8762	11.0035	95.9859	6.742	4.0141	95.9856	6.741	4.0144
2.500E-06	1.083	3.524	26.2590	17.1866	97.3060	7.578	2.6940	97.2955	7.570	2.7045
3.500E-06	1.059	1.652	9.0557	6.1886	98.0181	8.221	1.9819	97.9226	8.123	2.0774
4.500E-06	1.046	1.652	7.4341	6.1796	98.3730	8.635	1.6270	97.9256	8.126	2.0744
6.000E-06	1.035	1.982	4.2085	7.3277	99.2323	10.210	0.7677	97.9498	8.150	2.0502
8.500E-06	1.024	3.304	2.9758	13.4196	99.6744	12.008	0.3256	97.7477	7.953	2.2523
1.250E-05	1.017	4.846	1.6067	12.4503	99.8801	14.103	0.1199	98.5753	8.913	1.4247
2.000E-05	1.010	12.115	0.0981	5.3234	99.9971	21.887	0.0029	99.7563	12.616	0.2437
2.750E-05	1.008	67.401	0.0185	0.4050	99.9999	66.304	0.0001	99.9967	21.615	0.0033

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.512E+00
CORRECTED SIGMAP OF EFFLUENT = 2.663E+00
LOG-NORMAL GOODNESS OF FIT = 0.988
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	7.554E-17	1.424E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	4.704E+00	4.598E-12	4.704E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	1.560E+01	7.722E-08	1.560E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	1.872E+01	2.075E-05	1.872E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	2.630E+01	1.730E-03	2.630E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	3.173E+01	1.235E-01	3.185E+01	1.915E-01	2.500E-06
1.037E+01	9.929E+01	2.333E+01	1.124E+00	2.446E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	1.639E+01	4.507E+00	2.090E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	8.235E+00	1.376E+01	2.199E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	4.619E+00	2.733E+01	3.195E+01	3.297E+01	8.500E-06
3.146E+01	1.000E+02	2.444E+00	2.660E+01	2.905E+01	3.275E+01	1.250E-05
4.882E+01	1.000E+02	1.113E-01	9.149E+00	9.260E+00	1.511E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	2.099E+00	2.162E+00	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 47

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.512E+00 UM OUTLET SIGMAP = 2.663E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.1420	92.7505	5.502	7.2495	92.7505	5.502	7.2495
4.000E-07	1.530	0.253	2.3354	1.8064	87.9714	4.441	12.0286	87.9714	4.441	12.0286
7.000E-07	1.297	0.903	8.8651	6.8568	87.2072	4.311	12.7928	87.2072	4.311	12.7928
1.100E-06	1.188	0.815	7.1634	5.5406	88.5468	4.543	11.4532	88.5468	4.543	11.4532
1.600E-06	1.130	1.520	11.5362	8.9232	90.1102	4.851	9.8898	90.1097	4.851	9.8903
2.500E-06	1.083	3.524	21.6945	16.8231	91.9780	5.290	8.0220	91.9573	5.285	8.0427
3.500E-06	1.059	1.652	9.0002	7.1464	92.9008	5.546	7.0992	92.7120	5.491	7.2880
4.500E-06	1.046	1.652	8.6513	7.5586	93.1761	5.629	6.8239	92.2916	5.374	7.7084
6.000E-06	1.035	1.982	7.3927	8.7006	95.1397	6.341	4.8603	92.6043	5.460	7.3957
8.500E-06	1.024	3.304	9.1127	14.5180	96.4060	6.973	3.5940	92.5972	5.458	7.4028
1.250E-05	1.017	4.846	9.0758	14.4395	97.5596	7.785	2.4404	94.9800	6.273	5.0200
2.000E-05	1.010	12.115	2.9234	5.6835	99.6856	12.081	0.3144	99.2096	10.149	0.7904
2.750E-05	1.008	67.401	2.0658	1.8613	99.9601	16.408	0.0399	99.9535	16.088	0.0465

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 4.050E+00
CORRECTED SIGMAP OF EFFLUENT = 2.600E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.582E-01	1.493E-16	3.562E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	9.746E+00	9.089E-12	9.746E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	3.215E+01	1.527E-07	3.215E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	4.153E+01	4.101E-05	4.153E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	6.480E+01	3.420E-03	6.481E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	9.447E+01	2.442E-01	9.471E+01	1.915E-01	2.500E-06
1.037E+01	9.929E+01	8.357E+01	2.223E+00	8.580E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	6.875E+01	8.910E+00	7.766E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	5.213E+01	2.720E+01	7.933E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	5.098E+01	5.403E+01	1.050E+02	3.297E+01	8.500E-06
3.146E+01	1.000E+02	4.976E+01	5.259E+01	1.024E+02	3.275E+01	1.250E-05
4.882E+01	1.000E+02	1.195E+01	1.809E+01	3.004E+01	1.511E+01	2.000E-05
6.630E+01	1.000E+02	2.517E+01	4.150E+00	2.932E+01	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 48

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.050E+00 UM OUTLET SIGMAP = 2.600E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.1052	83.3481	3.759	16.6519	83.3481	3.759	16.6519
4.000E-07	1.530	0.253	1.3078	1.1348	76.5857	3.044	23.4143	76.5857	3.044	23.4143
7.000E-07	1.297	0.903	4.9032	4.2531	75.4048	2.941	24.5952	75.4048	2.941	24.5952
1.100E-06	1.188	0.815	4.1624	3.6105	76.8663	3.069	23.1337	76.8663	3.069	23.1337
1.600E-06	1.130	1.520	7.1693	6.2190	78.6357	3.236	21.3643	78.6348	3.236	21.3652
2.300E-06	1.083	3.524	14.9949	13.0321	80.7263	3.452	19.2737	80.6887	3.448	19.3113
3.500E-06	1.059	1.652	6.7415	5.9560	81.5156	3.540	18.4844	81.1730	3.501	18.8270
4.500E-06	1.046	1.652	6.7972	6.4035	81.3630	3.522	18.6370	79.7585	3.349	20.2415
6.000E-06	1.035	1.982	6.8997	7.7306	84.2318	3.873	15.7682	79.6323	3.336	20.3677
8.500E-06	1.024	3.304	10.1042	13.1363	86.1477	4.145	13.8523	79.2380	3.296	20.7620
1.250E-05	1.017	4.846	12.2164	14.9392	88.5813	4.550	11.4187	83.9017	3.830	16.0983
2.000E-05	1.010	12.115	9.2214	10.0017	96.5523	7.061	3.4477	95.6889	6.592	4.3111
2.750E-05	1.008	67.401	15.3608	13.4783	98.9677	9.589	1.0323	98.9558	9.565	1.0442

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 94.7780
CORRECTED MMD OF EFFLUENT = 6.601E+00
CORRECTED SIGMAP OF EFFLUENT = 3.080E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	8,183E-01	2,709E-16	8,183E-01	2,627E-16	2,000E-07
3,486E+00	8,104E+01	1,897E+01	1,649E-11	1,897E+01	7,436E-12	4,000E-07
3,918E+00	8,457E+01	6,181E+01	2,769E-07	6,181E+01	1,437E-07	7,000E-07
4,769E+00	8,972E+01	8,388E+01	7,440E-05	8,388E+01	2,415E-05	1,100E-06
5,911E+00	9,404E+01	1,400E+02	6,205E-03	1,400E+02	2,079E-03	1,600E-06
8,019E+00	9,782E+01	2,270E+02	4,430E-01	2,274E+02	1,915E-01	2,500E-06
1,037E+01	9,929E+01	2,176E+02	4,033E+00	2,216E+02	8,173E-01	3,500E-06
1,274E+01	9,977E+01	1,878E+02	1,616E+01	2,039E+02	3,628E+00	4,500E-06
1,630E+01	9,996E+01	1,691E+02	4,934E+01	2,185E+02	1,317E+01	6,000E-06
2,223E+01	1,000E+02	1,965E+02	9,802E+01	2,945E+02	3,297E+01	8,500E-06
3,146E+01	1,000E+02	2,328E+02	9,541E+01	3,282E+02	3,275E+01	1,250E-05
4,882E+01	1,000E+02	1,310E+02	3,281E+01	1,638E+02	1,511E+01	2,000E-05
6,630E+01	1,000E+02	6,505E+02	7,528E+00	6,580E+02	1,163E+00	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 49

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 6.601E+00 UM OUTLET SIGMAP = 3.080E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.03	0.0728	0.0682	64.3675	2.164	35.6325	64.3675	2.164	35.6325
4.000E-07	1.530	0.253	0.6774	0.6346	56.7538	1.758	43.2462	56.7538	1.758	43.2462
7.000E-07	1.297	0.903	2.4961	2.3383	55.3530	1.691	44.6470	55.3530	1.691	44.6470
1.100E-06	1.188	0.815	2.1898	2.0513	56.6033	1.750	43.3967	56.6033	1.750	43.3967
1.600E-06	1.130	1.520	3.9380	3.6891	58.1548	1.827	41.8452	58.1533	1.827	41.8467
2.500E-06	1.083	3.524	8.7495	8.2083	59.8988	1.916	40.1012	59.8396	1.913	40.1604
3.500E-06	1.059	1.652	4.0669	3.8614	60.2386	1.934	39.7614	59.6991	1.905	40.3009
4.500E-06	1.046	1.652	4.1342	4.1148	59.5802	1.899	40.4198	57.0536	1.772	42.9464
6.000E-06	1.035	1.982	4.5999	5.1416	62.5155	2.057	37.4845	55.2722	1.687	44.7278
8.500E-06	1.024	3.304	7.2745	8.8996	64.4392	2.168	35.5608	53.5577	1.608	46.4423
1.250E-05	1.017	4.846	9.7411	11.1963	67.5336	2.359	32.4664	60.1642	1.930	39.8358
2.000E-05	1.010	12.115	13.0892	13.2168	82.5497	3.660	17.4503	81.1901	3.503	18.8099
2.750E-05	1.008	67.401	38.9707	36.5797	90.6614	4.971	9.3386	90.6625	4.967	9.3375

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.328E+01
CORRECTED SIGMAP OF EFFLUENT = 3.781E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	4.266E-16	1.751E+00	2.627E-16	2.000E-07
3.486E+00	8.104E+01	3.504E+01	2.597E-11	3.504E+01	7.436E-12	4.000E-07
3.918E+00	8.457E+01	1.122E+02	4.361E-07	1.122E+02	1.437E-07	7.000E-07
4.769E+00	8.972E+01	1.573E+02	1.172E-04	1.573E+02	2.415E-05	1.100E-06
5.911E+00	9.404E+01	2.742E+02	9.772E-03	2.742E+02	2.079E-03	1.600E-06
8.019E+00	9.782E+01	4.722E+02	6.976E-01	4.729E+02	1.915E-01	2.500E-06
1.037E+01	9.929E+01	4.681E+02	6.351E+00	4.744E+02	8.173E-01	3.500E-06
1.274E+01	9.977E+01	4.072E+02	2.545E+01	4.327E+02	3.828E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	7.770E+01	4.798E+02	1.317E+01	6.000E-06
2.223E+01	1.000E+02	5.045E+02	1.544E+02	6.588E+02	3.297E+01	8.500E-06
3.146E+01	1.000E+02	6.620E+02	1.503E+02	8.122E+02	3.275E+01	1.250E-05
4.882E+01	1.000E+02	6.632E+02	5.167E+01	7.149E+02	1.511E+01	2.000E-05
6.630E+01	1.000E+02	5.884E+03	1.186E+01	5.896E+03	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 50

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.328E+01 UM OUTLET SIGMAP = 3.781E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.1804	97.6762	7.888	2.3238	97.6762	7.888	2.3238
4.000E-07	1.530	0.253	4.7115	2.9170	95.0987	6.323	4.9013	95.0987	6.323	4.9013
7.000E-07	1.297	0.903	17.8491	11.0507	94.7976	6.198	5.2024	94.7976	6.198	5.2024
1.100E-06	1.188	0.815	12.9822	8.0375	95.8076	6.650	4.1924	95.8076	6.650	4.1924
1.600E-06	1.130	1.520	18.0331	11.1654	96.8775	7.268	3.1225	96.8773	7.268	3.1227
2.500E-06	1.083	3.524	26.0236	16.1847	98.0564	8.262	1.9436	98.0476	8.253	1.9524
3.500E-06	1.059	1.652	8.3261	5.4664	98.6735	9.063	1.3265	98.5933	8.940	1.4067
4.500E-06	1.046	1.652	6.3882	5.4141	98.9823	9.619	1.0177	98.6068	8.960	1.3932
6.000E-06	1.035	1.982	3.0611	6.9136	99.5935	11.543	0.4065	98.5171	8.830	1.4829
8.500E-06	1.024	3.304	1.6599	13.5954	99.8678	13.898	0.1322	98.2507	8.483	1.7493
1.250E-05	1.017	4.846	0.6293	12.8734	99.9658	16.735	0.0342	98.8707	9.401	1.1293
2.000E-05	1.010	12.115	0.0192	5.7581	99.9996	48.821	0.0004	99.7980	13.009	0.2020
2.750E-05	1.008	67.401	0.0254	0.4433	99.9999	66.304	0.0001	99.9972	21.983	0.0028

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 3.501E+00
CORRECTED SIGMAP OF EFFLUENT = 2.724E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.142E-01	6.340E-17	1.142E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	3.971E+00	3.859E-12	3.971E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	1.308E+01	6.481E-08	1.308E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	1.520E+01	1.741E-05	1.520E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	2.046E+01	1.452E-03	2.046E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	2.289E+01	1.037E-01	2.299E+01	1.915E-01	2.500E-06
1.037E+01	9.929E+01	1.562E+01	9.437E-01	1.656E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	1.025E+01	3.783E+00	1.404E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	4.360E+00	1.155E+01	1.591E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	1.876E+00	2.294E+01	2.482E+01	3.297E+01	8.500E-06
3.146E+01	1.000E+02	6.968E-01	2.233E+01	2.303E+01	3.275E+01	1.250E-05
4.882E+01	1.000E+02	1.587E-02	7.679E+00	7.694E+00	1.511E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	1.762E+00	1.824E+00	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 51

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.501E+00 UM OUTLET SIGMAP = 2.724E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.1653	96.1885	6.850	3.8115	96.1885	6.850	3.8115
4.000E-07	1.530	0.253	3.4620	2.3879	92.8186	5.522	7.1814	92.8186	5.522	7.1814
7.000E-07	1.297	0.903	13.2808	9.1603	92.2814	5.371	7.7186	92.2814	5.371	7.7186
1.100E-06	1.188	0.815	10.3039	7.1071	93.3648	5.688	6.6352	93.3648	5.688	6.6352
1.600E-06	1.130	1.520	15.5806	10.7472	94.6205	6.128	5.3795	94.6201	6.128	5.3799
2.500E-06	1.083	3.524	25.9676	17.9704	96.1328	6.820	3.8672	96.1199	6.813	3.8801
3.500E-06	1.059	1.652	9.5269	6.8251	96.9735	7.334	3.0265	96.8565	7.254	3.1435
4.500E-06	1.046	1.652	8.2266	6.8640	97.3866	7.641	2.6134	96.8386	7.242	3.1614
6.000E-06	1.035	1.982	5.3236	7.7641	98.5904	8.936	1.4096	97.0194	7.366	2.9806
8.500E-06	1.024	3.304	4.5539	13.3891	99.2766	10.335	0.7234	96.9166	7.295	3.0834
1.250E-05	1.017	4.846	3.1180	12.3302	99.6623	11.932	0.3377	98.0640	8.270	1.9360
2.000E-05	1.010	12.115	0.3371	4.9278	99.9854	18.517	0.0146	99.6905	12.115	0.3095
2.750E-05	1.008	67.401	0.0794	0.3616	99.9994	66.304	0.0006	99.9959	21.190	0.0041

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.547E+00
CORRECTED SIGMAP OF EFFLUENT = 2.612E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	9.253E-17	1.873E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	5.819E+00	5.632E-12	5.819E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	1.940E+01	9.459E-08	1.940E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	2.406E+01	2.541E-05	2.406E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	3.525E+01	2.119E-03	3.525E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	4.554E+01	1.513E-01	4.569E+01	1.915E-01	2.300E-06
1.037E+01	9.929E+01	3.563E+01	1.377E+00	3.701E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	2.633E+01	5.521E+00	3.185E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	1.685E+01	3.197E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	1.026E+01	3.348E+01	4.374E+01	3.297E+01	8.500E-06
3.146E+01	1.000E+02	6.885E+00	3.259E+01	3.947E+01	3.275E+01	1.250E-05
4.882E+01	1.000E+02	5.550E-01	1.121E+01	1.176E+01	1.511E+01	2.000E-05
6.630E+01	1.000E+02	3.894E-01	2.571E+00	2.961E+00	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 52

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.547E+00 UM OUTLET SIGMAP = 2.612E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.1567	99.3710	6.033	5.6290	99.3710	6.033	5.6290
4.000E-07	1.530	0.253	2.8175	2.0796	90.2545	4.882	9.7455	90.2545	4.882	9.7455
7.000E-07	1.297	0.903	10.8492	8.0076	89.4860	4.723	10.5140	89.4860	4.723	10.5140
1.100E-06	1.188	0.815	8.7955	6.4549	90.6096	4.960	9.3904	90.6096	4.960	9.3904
1.600E-06	1.130	1.520	13.8731	10.2401	92.0125	5.299	7.9875	92.0125	5.299	7.9875
2.500E-06	1.083	3.524	24.9052	18.4323	93.8154	5.835	6.1846	93.7985	5.830	6.2015
3.500E-06	1.059	1.652	9.7131	7.3831	94.8548	6.221	5.1452	94.7011	6.159	5.2989
4.500E-06	1.044	1.652	8.7730	7.4779	95.3527	6.434	4.6473	94.6331	6.133	5.3669
6.000E-06	1.035	1.982	9.4826	8.2331	97.1378	7.451	2.8622	95.0749	6.313	4.9251
8.500E-06	1.024	3.309	6.5732	13.4876	98.2590	8.493	1.7410	95.1600	6.349	4.8400
1.250E-05	1.017	4.846	5.5095	12.6008	99.0051	9.666	0.9949	96.9063	7.288	3.0937
2.000E-05	1.010	12.115	1.0816	4.7550	99.9219	15.001	0.0781	99.5347	11.260	0.4653
2.750E-05	1.008	67.401	0.4642	0.6473	99.9940	20.373	0.0060	99.9886	19.039	0.0114

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 98.8148
CORRECTED MMD OF EFFLUENT = 3.482E+00
CORRECTED SIGMAP OF EFFLUENT = 2.584E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	2.766E-01	1.215E-16	2.766E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	7.896E+00	7.396E-12	7.896E+00	7.436E-12	4.000E-07
3.918E+00	8.457E+01	2.642E+01	1.242E-07	2.642E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	3.405E+01	3.337E-05	3.405E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	5.234E+01	2.783E-03	5.234E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	7.283E+01	1.987E-01	7.303E+01	1.915E-01	2.500E-06
1.037E+01	9.929E+01	6.057E+01	1.809E+00	6.238E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	4.682E+01	7.249E+00	5.407E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	3.070E+01	2.213E+01	5.283E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	2.470E+01	4.396E+01	6.866E+01	3.297E+01	8.500E-06
3.146E+01	1.000E+02	2.029E+01	4.279E+01	6.308E+01	3.275E+01	1.250E-05
4.882E+01	1.000E+02	2.969E+00	1.472E+01	1.769E+01	1.511E+01	2.000E-05
6.630E+01	1.000E+02	3.798E+00	3.377E+00	7.174E+00	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 53

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.682E+00 UM OUTLET SIGMAP = 2.586E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.1489	91.8187	5.249	8.1813	91.8187	5.249	8.1813
4.000E-07	1.530	0.253	2.3418	1.8277	86.9043	4.262	13.0957	86.9043	4.262	13.0957
7.000E-07	1.297	0.903	9.0162	7.0368	85.8735	4.103	14.1265	85.8735	4.103	14.1265
1.100E-06	1.188	0.815	7.4873	5.8435	87.0024	4.278	12.9976	87.0024	4.278	12.9976
1.600E-06	1.130	1.520	12.3234	9.6184	88.5295	4.540	11.4705	88.5289	4.540	11.4711
2.500E-06	1.083	3.524	23.3765	18.2865	90.6149	4.961	9.3851	90.5932	4.956	9.4068
3.500E-06	1.059	1.652	9.5059	7.5984	91.8589	5.259	8.1411	91.6620	5.209	8.3380
4.500E-06	1.046	1.652	8.8244	7.7275	92.4426	5.415	7.5574	91.5204	5.174	8.4796
6.000E-06	1.035	1.982	7.1634	8.4813	94.8866	6.234	5.1134	92.2428	5.360	7.7572
8.500E-06	1.024	3.304	8.1009	13.5613	96.5311	7.048	3.4689	92.5594	5.448	7.4406
1.250E-05	1.017	4.846	7.6993	13.1994	97.7522	7.957	2.2478	95.0624	6.307	4.9376
2.000E-05	1.010	12.115	2.3700	5.1662	99.7232	12.349	0.2768	99.2270	10.195	0.7730
2.750E-05	1.008	67.401	1.6000	1.5041	99.9664	16.771	0.0336	99.9595	16.381	0.0405

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 1.50
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 3.833E+00
CORRECTED SIGMAP OF EFFLUENT = 2.554E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	1.557E-16	4.020E-01	2.627E-16	2.000E-07
3.486E+00	8.104E+01	1.061E+01	9.478E-12	1.061E+01	7.436E-12	4.000E-07
3.918E+00	8.457E+01	3.550E+01	1.592E-07	3.550E+01	1.437E-07	7.000E-07
4.769E+00	8.972E+01	4.713E+01	4.277E-05	4.713E+01	2.415E-05	1.100E-06
5.911E+00	9.404E+01	7.516E+01	3.567E-03	7.517E+01	2.079E-03	1.600E-06
8.019E+00	9.782E+01	1.105E+02	2.546E-01	1.108E+02	1.915E-01	2.500E-06
1.037E+01	9.929E+01	9.584E+01	2.318E+00	9.816E+01	8.173E-01	3.500E-06
1.274E+01	9.977E+01	7.614E+01	9.291E+00	8.543E+01	3.828E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	2.836E+01	8.321E+01	1.317E+01	6.000E-06
2.223E+01	1.000E+02	4.921E+01	5.634E+01	1.056E+02	3.297E+01	8.500E-06
3.146E+01	1.000E+02	4.583E+01	5.484E+01	1.007E+02	3.275E+01	1.250E-05
4.882E+01	1.000E+02	1.052E+01	1.886E+01	2.938E+01	1.511E+01	2.000E-05
6.630E+01	1.000E+02	2.116E+01	4.327E+00	2.549E+01	1.163E+00	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 54

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.150E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.833E+00 UM OUTLET SIGMAP = 2.554E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAS = 0.80

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.3449	0.7716	98.7634	9.210	1.2366	94.8172	6.206	5.1828
4.000E-07	1.530	0.253	6.4038	4.1979	97.0053	7.356	2.9947	96.3224	6.925	3.6776
7.000E-07	1.297	0.903	24.0548	14.5228	96.8480	7.249	3.1520	96.4353	6.991	3.5647
1.100E-06	1.188	0.815	16.2242	10.3041	97.6447	7.859	2.3553	97.1977	7.495	2.8023
1.600E-06	1.130	1.520	20.1366	13.0217	98.4326	8.713	1.5674	98.1012	8.311	1.8988
2.500E-06	1.083	3.524	23.1421	16.2029	99.2230	10.185	0.7770	98.9809	9.616	1.0191
3.500E-06	1.059	1.652	5.6379	5.1536	99.5962	11.557	0.4038	99.3086	10.429	0.6914
4.500E-06	1.046	1.652	3.2086	4.4518	99.7702	12.739	0.2298	99.4027	10.736	0.5973
6.000E-06	1.035	1.982	0.7054	3.6958	99.9579	16.297	0.0421	99.5867	11.508	0.4133
8.500E-06	1.024	3.304	0.0695	4.4151	99.9975	22.227	0.0025	99.7038	12.207	0.2962
1.250E-05	1.017	4.846	0.0041	4.4601	99.9999	31.459	0.0001	99.7960	12.989	0.2040
2.000E-05	1.010	12.115	0.0102	5.5371	99.9999	48.821	0.0001	99.8987	14.456	0.1013
2.750E-05	1.008	67.401	0.0565	13.2656	99.9999	66.304	0.0001	99.9564	16.223	0.0436

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 3.439E+00
CORRECTED SIGMAP OF EFFLUENT = 3.709E+00
LOG-NORMAL GOODNESS OF FIT = 0.963
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	4,077E-02	1,939E-01	2,547E-01	1,259E+00	2,000E-07
3,486E+00	8,104E+01	2,426E+00	5,533E-01	2,980E+00	1,671E+00	4,000E-07
3,918E+00	8,457E+01	7,922E+00	1,037E+00	8,959E+00	3,604E+00	7,000E-07
4,769E+00	8,972E+01	8,540E+00	1,621E+00	1,016E+01	3,523E+00	1,100E-06
5,911E+00	9,404E+01	1,027E+01	2,171E+00	1,244E+01	4,871E+00	1,600E-06
8,019E+00	9,782E+01	9,150E+00	2,851E+00	1,200E+01	8,251E+00	2,500E-06
1,037E+01	9,929E+01	4,753E+00	3,386E+00	8,140E+00	4,595E+00	3,500E-06
1,274E+01	9,977E+01	2,315E+00	3,702E+00	6,017E+00	5,871E+00	4,500E-06
1,630E+01	9,996E+01	4,517E-01	3,982E+00	4,433E+00	7,114E+00	6,000E-06
2,223E+01	1,000E+02	3,531E-02	4,166E+00	4,202E+00	9,383E+00	8,500E-06
3,146E+01	1,000E+02	2,022E-03	4,159E+00	4,161E+00	9,558E+00	1,250E-05
4,882E+01	1,000E+02	3,769E-03	3,850E+00	3,854E+00	1,187E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	2,749E+01	2,755E+01	2,843E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 55

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.439E+00 UM OUTLET SIGMAP = 3.709E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	0.6109	97.1023	7.425	2.8977	89.7349	4.773	10.2651
4.000E-07	1.530	0.253	4.0629	3.2306	94.1940	5.968	5.8060	92.9191	5.552	7.0809
7.000E-07	1.297	0.903	15.5003	11.3604	93.7940	5.828	6.2060	93.0235	5.583	6.9765
1.100E-06	1.188	0.815	11.6397	8.8151	94.8365	6.214	5.1635	94.0021	5.900	5.9979
1.600E-06	1.130	1.520	16.8762	12.6986	95.9859	6.742	4.0141	95.3672	6.441	4.6328
2.500E-06	1.083	3.524	26.2590	19.9925	97.3060	7.578	2.6940	96.8540	7.252	3.1460
3.500E-06	1.059	1.652	9.0557	7.5039	98.0181	8.221	1.9819	97.4811	7.719	2.5189
4.500E-06	1.046	1.652	7.4341	6.8907	98.3730	8.635	1.6270	97.6869	7.899	2.3131
6.000E-06	1.035	1.982	8.2085	5.2207	99.2323	10.210	0.7677	98.5393	8.861	1.4607
8.500E-06	1.024	3.304	2.9758	5.2070	99.6744	12.008	0.3256	99.1261	9.938	0.8739
1.250E-05	1.017	4.846	1.6067	4.3752	99.8801	14.103	0.1199	99.4993	11.106	0.5007
2.000E-05	1.010	12.115	0.0981	4.1958	99.9971	21.887	0.0029	99.8079	13.115	0.1921
2.750E-05	1.008	67.401	0.0185	9.8988	99.9999	66.304	0.0001	99.9186	14.914	0.0814

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.403E+00
CORRECTED SIGMAP OF EFFLUENT = 3.228E+00
LOG-NORMAL GOODNESS OF FIT = 0.979
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	3.620E-01	5.044E-01	1.259E+00	2.000E-07
3.486E+00	8.104E+01	4.704E+00	1.033E+00	5.737E+00	1.671E+00	4.000E-07
3.918E+00	8.457E+01	1.560E+01	1.936E+00	1.753E+01	3.604E+00	7.000E-07
4.769E+00	8.972E+01	1.872E+01	3.026E+00	2.175E+01	3.523E+00	1.100E-06
5.911E+00	9.404E+01	2.630E+01	4.054E+00	3.036E+01	4.471E+00	1.600E-06
8.019E+00	9.782E+01	3.173E+01	5.323E+00	3.705E+01	8.251E+00	2.500E-06
1.037E+01	9.929E+01	2.333E+01	6.322E+00	2.965E+01	4.595E+00	3.500E-06
1.274E+01	9.977E+01	1.639E+01	6.912E+00	2.330E+01	5.871E+00	4.500E-06
1.630E+01	9.996E+01	8.235E+00	7.434E+00	1.567E+01	7.114E+00	6.000E-06
2.223E+01	1.000E+02	4.619E+00	7.778E+00	1.240E+01	9.383E+00	8.500E-06
3.146E+01	1.000E+02	2.444E+00	7.764E+00	1.021E+01	9.558E+00	1.250E-05
4.882E+01	1.000E+02	1.113E-01	7.188E+00	7.299E+00	1.187E+01	2.000E-05
6.630E+01	1.000E+02	6.250E-02	5.132E+01	5.138E+01	2.843E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 56

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.403E+00 UM OUTLET SIGMAP = 3.228E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM. RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	0.4273	92.7505	5.502	7.2495	78.1861	3.192	21.8139
4.000E-07	1.530	0.253	2.3354	2.1848	87.9714	4.441	12.0286	85.4511	4.042	14.5489
7.000E-07	1.297	0.903	8.8651	7.6732	87.2072	4.311	12.7928	85.6840	4.076	14.3160
1.100E-06	1.188	0.815	7.1634	6.3386	88.5468	4.543	11.4532	86.8972	4.261	13.1028
1.600E-06	1.130	1.520	11.5362	10.0263	90.1102	4.851	9.8898	88.8871	4.607	11.1129
2.500E-06	1.083	3.524	21.6945	18.6489	91.9780	5.290	8.0220	91.0845	5.068	8.9155
3.500E-06	1.059	1.652	9.0002	8.0023	92.9008	5.546	7.0992	91.8392	5.254	8.1608
4.500E-06	1.046	1.652	8.6513	8.0213	93.1761	5.629	6.8239	91.8198	5.249	8.1802
6.000E-06	1.035	1.982	7.3927	7.3296	95.1397	6.341	4.8603	93.7697	5.820	6.2303
8.500E-06	1.024	3.304	9.1127	9.1740	96.4060	6.973	3.5940	95.3221	6.421	4.6779
1.250E-05	1.017	4.846	9.0758	9.1850	97.5596	7.785	2.4404	96.8068	7.221	3.1932
2.000E-05	1.010	12.115	2.9234	4.9497	99.6856	12.081	0.3144	99.3117	10.439	0.6883
2.750E-05	1.008	67.401	2.0658	8.0390	99.9601	16.408	0.0399	99.7991	13.020	0.2009

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 4.110E+00
CORRECTED SIGMAP OF EFFLUENT = 3.033E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP-RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.562E+01	7.157E+01	1.072E+00	1.259E+00	2.000E-07
3.486E+00	8.104E+01	9.746E+00	2.042E+00	1.179E+01	1.671E+00	4.000E-07
3.918E+00	8.457E+01	3.215E+01	3.828E+00	3.598E+01	3.604E+00	7.000E-07
4.769E+00	8.972E+01	4.153E+01	5.981E+00	4.751E+01	3.523E+00	1.100E-06
5.911E+00	9.404E+01	6.480E+01	8.014E+00	7.282E+01	4.871E+00	1.600E-06
8.019E+00	9.782E+01	9.447E+01	1.052E+01	1.050E+02	8.251E+00	2.500E-06
1.037E+01	9.929E+01	8.357E+01	1.250E+01	9.407E+01	4.595E+00	3.500E-06
1.274E+01	9.977E+01	6.875E+01	1.366E+01	8.241E+01	5.871E+00	4.500E-06
1.630E+01	9.996E+01	5.213E+01	1.470E+01	6.683E+01	7.114E+00	6.000E-06
2.223E+01	1.000E+02	5.098E+01	1.538E+01	6.636E+01	9.383E+00	8.500E-06
3.146E+01	1.000E+02	4.976E+01	1.535E+01	6.511E+01	9.558E+00	1.250E-05
4.862E+01	1.000E+02	1.195E+01	1.421E+01	2.616E+01	1.187E+01	2.000E-05
6.630E+01	1.000E+02	2.517E+01	1.015E+02	1.266E+02	2.883E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 57

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 4.110E+00 UM OUTLET SIGMAP = 3.033E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-PAP EFF.	NO-PAP P	NO-PAP P	COR. EFF.	COR. P	COR. P
2.000E-07	2.123	0.033	0.1213	0.2723	83.3481	3.759	16.6519	56.9266	1.766	43.0734
4.000E-07	1.530	0.253	1.3878	1.3559	76.5857	3.044	23.4143	72.0135	2.670	27.9865
7.000E-07	1.297	0.903	4.9032	4.7309	75.4048	2.941	24.5952	72.6616	2.718	27.3384
1.100E-06	1.188	0.815	4.1624	4.0776	76.8663	3.069	23.1337	73.8738	2.814	26.1262
1.600E-06	1.130	1.520	7.1693	6.8665	78.6357	3.236	21.3643	76.4169	3.029	23.5831
2.500E-06	1.083	3.324	14.9949	14.1007	80.7263	3.459	19.2737	79.1052	3.283	20.8948
3.500E-06	1.059	2.452	8.7415	8.4569	81.5156	3.540	18.4844	79.5896	3.332	20.4104
4.500E-06	1.046	1.652	6.7972	6.6743	81.3630	3.522	18.6370	78.9025	3.262	21.0975
6.000E-06	1.035	1.982	6.8997	6.9281	84.2318	3.873	15.7682	81.7465	3.566	18.2535
8.500E-06	1.028	3.304	10.1042	10.0048	86.1477	4.168	13.8523	84.1814	3.866	15.8186
1.250E-05	1.017	4.846	12.2164	11.8639	88.5813	4.550	11.4187	87.2157	4.313	12.7843
2.000E-05	1.010	12.115	9.2218	9.5723	96.5523	7.061	3.4477	95.8740	6.686	4.1260
2.750E-05	1.008	87.401	15.3608	17.0946	98.9677	9.589	1.0323	98.6756	9.067	1.3244

EFFICIENCY = STATED = 99.60 COMPUTED = 98.5393 CONVERGENCE OBTAINED

ADJUSTED NO-PAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 8.685E-01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
MMD OF EFFLUENT UNDER NO-PAP CONDITIONS = 6.224E-00
SIGMAP OF EFFLUENT UNDER NO-PAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-PAP CONDITIONS = 6.488

SIGMAG = 0.250 WITH 0.500 BREAKAGE OVER 4.000 STAGES
NTEMP = 1
PMMD = 10.00
PSIGMA = 5.00
CORR. EFF. = 96.7780
CORRECTED MMD OF EFFLUENT = 6.567E+00
CORRECTED SIGMAP OF EFFLUENT = 3.385E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
CORRECTED PRECIPITATION RATE PARAMETER = 6.19

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E+01	1.298E+00	2.117E+00	1.259E+00	2.000E-07
3.486E+00	8.104E+01	1.897E+01	3.705E+00	2.268E+01	1.671E+00	4.000E-07
3.918E+00	8.457E+01	6.181E+01	6.945E+00	6.876E+01	3.604E+00	7.000E-07
4.769E+00	8.972E+01	8.388E+01	1.085E+01	9.473E+01	3.523E+00	1.100E-06
5.911E+00	9.404E+01	1.400E+02	1.454E+01	1.545E+02	4.871E+00	1.600E-06
8.019E+00	9.782E+01	2.270E+02	1.909E+01	2.461E+02	8.251E+00	2.500E-06
1.037E+01	9.929E+01	2.176E+02	2.267E+01	2.403E+02	4.595E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	2.479E+01	2.125E+02	5.871E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	2.666E+01	1.958E+02	7.114E+00	6.000E-06
2.223E+01	1.000E+02	1.965E+02	2.790E+01	2.244E+02	9.383E+00	8.500E-06
3.146E+01	1.000E+02	2.328E+02	2.784E+01	2.607E+02	9.558E+00	1.250E-05
4.882E+01	1.000E+02	1.310E+02	2.578E+01	1.568E+02	1.187E+01	2.000E-05
6.630E+01	1.000E+02	6.505E+02	1.840E+02	8.345E+02	2.843E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 58

ESP PERFORMANCE: EFFICIENCY = 94.7780 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 6.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 6.547E+00 UM OUTLET SIGMAP = 3.385E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.0728	0.1478	64.3675	2.168	35.6325	22.7586	0.541	77.2414
4.000E-07	1.530	0.253	0.6774	0.7402	56.7538	1.758	43.2462	49.5533	1.435	50.4467
7.000E-07	1.297	0.903	2.4961	2.5662	55.3530	1.691	44.6470	51.0015	1.496	48.9985
1.100E-06	1.188	0.815	2.1898	2.2741	56.6033	1.750	43.3967	51.8906	1.538	48.1094
1.600E-06	1.130	1.520	3.9380	3.9970	58.1548	1.827	41.8452	54.6606	1.658	45.3394
2.500E-06	1.083	3.524	8.7495	8.7179	59.8988	1.916	40.1012	57.3459	1.786	42.6541
3.500E-06	1.059	1.652	4.0669	4.1003	60.2386	1.934	39.7614	57.2055	1.780	42.7945
4.500E-06	1.046	1.652	4.1342	4.2040	59.5802	1.899	40.4198	55.7055	1.707	44.2945
6.000E-06	1.035	1.982	4.5999	4.7589	62.5155	2.057	37.4845	58.6016	1.849	41.3984
8.500E-06	1.024	3.304	7.2745	7.4078	64.4392	2.168	35.5608	61.3425	1.993	38.6575
1.250E-05	1.017	4.846	9.7411	9.7295	67.5336	2.359	32.4664	65.3830	2.224	34.6170
2.000E-05	1.010	12.115	13.0892	13.0120	82.5497	3.660	17.4503	81.4816	3.536	18.5184
2.750E-05	1.008	67.401	38.9707	38.3043	90.6614	4.971	9.3386	90.2014	4.870	9.7986

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 82.7582
CORRECTED MMD OF EFFLUENT = 1.356E+01
CORRECTED SIGMAP OF EFFLUENT = 4.109E+00
LOG-NORMAL GOODNESS OF FIT = 0.991
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	2.045E+00	3.796E+00	1.259E+00	2.000E-07
3.486E+00	8.104E+01	3.504E+01	5.834E+00	4.087E+01	1.671E+00	4.000E-07
3.918E+00	8.457E+01	1.122E+02	1.094E+01	1.231E+02	3.604E+00	7.000E-07
4.769E+00	8.972E+01	1.573E+02	1.709E+01	1.744E+02	3.523E+00	1.100E-06
5.911E+00	9.404E+01	2.742E+02	2.290E+01	2.971E+02	4.871E+00	1.600E-06
8.019E+00	9.782E+01	4.722E+02	3.006E+01	5.023E+02	8.251E+00	2.500E-06
1.037E+01	9.929E+01	4.681E+02	3.571E+01	5.038E+02	4.595E+00	3.500E-06
1.274E+01	9.977E+01	4.072E+02	3.904E+01	4.462E+02	5.871E+00	4.500E-06
1.630E+01	9.996E+01	4.071E+02	4.198E+01	4.491E+02	7.114E+00	6.000E-06
2.223E+01	1.000E+02	5.045E+02	4.393E+01	5.484E+02	9.383E+00	8.500E-06
3.146E+01	1.000E+02	6.620E+02	4.385E+01	7.058E+02	9.558E+00	1.250E-05
4.882E+01	1.000E+02	6.632E+02	4.059E+01	7.038E+02	1.187E+01	2.000E-05
6.630E+01	1.000E+02	5.884E+03	2.898E+02	6.174E+03	2.843E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 59

ESP PERFORMANCE: EFFICIENCY = 82.7582 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.356E+01 UM OUTLET SIGMAP = 4.109E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	0.6604	97.6762	7.888	2.3238	91.4930	5.167	8.5070
4.000E-07	1.530	0.253	4.7115	3.5538	95.0987	6.323	4.9013	94.0287	5.909	5.9713
7.000E-07	1.297	0.903	17.8491	12.4243	94.7976	6.19A	5.2024	94.1510	5.952	5.8490
1.100E-06	1.188	0.815	12.9822	9.3802	95.8076	6.650	4.1924	95.1072	6.327	4.8928
1.600E-06	1.130	1.520	18.0331	13.0212	96.8775	7.268	3.1225	96.3583	6.946	3.6417
2.500E-06	1.083	3.524	26.0236	19.2566	98.0564	8.262	1.9436	97.6770	7.888	2.3230
3.500E-06	1.059	1.652	8.3261	6.9064	98.6735	9.063	1.3265	98.2228	8.450	1.7772
4.500E-06	1.046	1.652	6.3882	6.1927	98.9823	9.619	1.0177	98.4064	8.679	1.5936
6.000E-06	1.035	1.982	3.0611	4.6068	99.5935	11.543	0.4065	99.0119	9.681	0.9881
8.500E-06	1.024	3.304	1.6599	4.6043	99.8678	13.898	0.1322	99.4076	10.753	0.5924
1.250E-05	1.017	4.846	0.6293	4.0327	99.9658	16.735	0.0342	99.6462	11.834	0.3538
2.000E-05	1.010	12.115	0.0192	4.5235	99.9996	48.821	0.0004	99.8413	13.515	0.1587
2.750E-05	1.008	67.401	0.0254	10.8372	99.9999	66.304	0.0001	99.9316	15.281	0.0684

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.736A
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.456

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 3.355E+00
CORRECTED SIGMAP OF EFFLUENT = 3.349E+00
LOG-NORMAL GOODNESS OF FIT = 0.974
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,142E-01	3,038E-01	4,180E-01	1,259E+00	2,000E-07
3,486E+00	8,104E+01	3,971E+00	8,670E-01	4,838E+00	1,671E+00	4,000E-07
3,918E+00	8,457E+01	1,308E+01	1,625E+00	1,470E+01	3,604E+00	7,000E-07
4,769E+00	8,972E+01	1,520E+01	2,539E+00	1,774E+01	3,523E+00	1,100E-06
5,911E+00	9,404E+01	2,046E+01	3,402E+00	2,386E+01	4,871E+00	1,600E-06
8,019E+00	9,782E+01	2,289E+01	4,468E+00	2,736E+01	8,251E+00	2,500E-06
1,037E+01	9,929E+01	1,562E+01	5,306E+00	2,092E+01	4,595E+00	3,500E-06
1,274E+01	9,977E+01	1,025E+01	5,801E+00	1,605E+01	5,871E+00	4,500E-06
1,630E+01	9,996E+01	4,360E+00	6,239E+00	1,060E+01	7,114E+00	6,000E-06
2,223E+01	1,000E+02	1,876E+00	6,528E+00	8,404E+00	9,383E+00	8,500E-06
3,146E+01	1,000E+02	6,968E-01	6,516E+00	7,213E+00	9,558E+00	1,250E-05
4,882E+01	1,000E+02	1,587E-02	6,032E+00	6,048E+00	1,187E+01	2,000E-05
6,630E+01	1,000E+02	6,250E-02	4,307E+01	4,313E+01	2,843E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 60

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.355E+00 UM OUTLET SIGMAP = 3.349E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	0.5567	96.1885	6.850	3.8115	87.1640	4.304	12.8360
4.000E-07	1.530	0.253	3.4620	2.9071	92.8186	5.522	7.1814	91.2569	5.109	8.7431
7.000E-07	1.297	0.903	13.2808	10.2804	92.2814	5.371	7.7186	91.3376	5.129	8.6624
1.100E-06	1.188	0.815	10.3039	8.2019	93.3648	5.688	6.6352	92.3427	5.387	7.6573
1.600E-06	1.130	1.520	15.5806	12.2605	94.6205	6.128	5.3795	93.8626	5.851	6.1374
2.500E-06	1.083	3.524	25.9676	20.4753	96.1328	6.820	3.8672	95.5791	6.539	4.4209
3.500E-06	1.059	1.652	9.5269	7.9994	96.9735	7.334	3.0265	96.3156	6.921	3.6844
4.500E-06	1.046	1.652	8.2266	7.4988	97.3866	7.641	2.6134	96.5462	7.057	3.4538
6.000E-06	1.035	1.982	5.3236	5.8831	98.5904	8.936	1.4096	97.7415	7.947	2.2585
8.500E-06	1.024	3.304	4.5539	6.0574	99.2766	10.335	0.7234	98.6050	8.958	1.3950
1.250E-05	1.017	4.846	3.1180	5.1213	99.6623	11.932	0.3377	99.1959	10.113	0.8041
2.000E-05	1.010	12.115	0.3371	3.9211	99.9854	18.517	0.0146	99.7537	12.594	0.2463
2.750E-05	1.008	67.401	0.0794	8.8370	99.9994	66.304	0.0006	99.9002	14.488	0.0998

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.474E+00
CORRECTED SIGMAP OF EFFLUENT = 3.114E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	4.435E-01	6.308E-01	1.259E+00	2.000E-07
3.486E+00	8.104E+01	5.819E+00	1.265E+00	7.084E+00	1.671E+00	4.000E-07
3.918E+00	8.457E+01	1.940E+01	2.372E+00	2.177E+01	3.604E+00	7.000E-07
4.769E+00	8.972E+01	2.406E+01	3.706E+00	2.776E+01	3.523E+00	1.100E-06
5.911E+00	9.404E+01	3.525E+01	4.966E+00	4.022E+01	4.871E+00	1.600E-06
8.019E+00	9.782E+01	4.554E+01	6.520E+00	5.206E+01	8.251E+00	2.500E-06
1.037E+01	9.929E+01	3.563E+01	7.744E+00	4.337E+01	4.595E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	8.466E+00	3.480E+01	5.871E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	9.105E+00	2.423E+01	7.114E+00	6.000E-06
2.223E+01	1.000E+02	1.026E+01	9.528E+00	1.979E+01	9.383E+00	8.500E-06
3.146E+01	1.000E+02	6.885E+00	9.510E+00	1.640E+01	9.558E+00	1.250E-05
4.882E+01	1.000E+02	5.550E-01	8.804E+00	9.359E+00	1.187E+01	2.000E-05
6.630E+01	1.000E+02	3.894E-01	6.286E+01	6.325E+01	2.843E+01	3.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 61

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.474E+00 UM OUTLET SIGMAP = 3.114E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	0.4865	94.3710	6.033	5.6290	82.5209	3.657	17.4791
4.000E-07	1.530	0.253	2.8175	2.5171	90.2545	4.882	9.7455	88.2039	4.481	11.7961
7.000E-07	1.297	0.903	10.8492	8.9515	89.4860	4.723	10.5140	88.2467	4.489	11.7533
1.100E-06	1.188	0.815	8.7455	7.3775	90.6096	4.960	9.3904	89.2674	4.680	10.7326
1.600E-06	1.130	1.520	13.8731	11.5153	92.0129	5.299	7.9871	91.0177	5.053	8.9823
2.500E-06	1.083	3.524	24.9052	20.5432	93.8154	5.835	6.1846	93.0883	5.602	6.9117
3.500E-06	1.059	1.652	9.7131	8.3726	94.8548	6.221	5.1452	93.9910	5.896	6.0090
4.500E-06	1.046	1.652	8.7730	8.0128	95.3527	6.434	4.6473	94.2492	5.988	5.7508
6.000E-06	1.035	1.982	6.4826	6.6480	97.1378	7.451	2.8622	96.0231	6.761	3.9769
8.500E-06	1.024	3.304	6.5732	7.3092	98.2590	8.493	1.7410	97.3771	7.634	2.6229
1.250E-05	1.017	4.846	5.5095	6.5699	99.0051	9.666	0.9949	98.3926	8.660	1.6074
2.000E-05	1.010	12.115	1.0816	3.9067	99.9219	15.001	0.0781	99.6177	11.672	0.3823
2.750E-05	1.008	67.401	0.4642	7.7895	99.9940	20.373	0.0060	99.8630	13.823	0.1370

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 3.639E+00
CORRECTED SIGMAP OF EFFLUENT = 3.010E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	2.766E-01	5.823E-01	8.589E-01	1.259E+00	2.000E-07
3.486E+00	8.104E+01	7.896E+00	1.662E+00	9.558E+00	1.671E+00	4.000E-07
3.918E+00	8.457E+01	2.642E+01	3.115E+00	2.954E+01	3.604E+00	7.000E-07
4.769E+00	8.972E+01	3.405E+01	4.866E+00	3.891E+01	3.523E+00	1.100E-06
5.911E+00	9.404E+01	5.234E+01	6.521E+00	5.886E+01	4.871E+00	1.600E-06
8.019E+00	9.782E+01	7.283E+01	8.562E+00	8.139E+01	8.251E+00	2.500E-06
1.037E+01	9.929E+01	6.057E+01	1.017E+01	7.074E+01	4.595E+00	3.500E-06
1.274E+01	9.977E+01	4.682E+01	1.112E+01	5.794E+01	5.871E+00	4.500E-06
1.630E+01	9.996E+01	3.070E+01	1.196E+01	4.266E+01	7.114E+00	6.000E-06
2.223E+01	1.000E+02	2.470E+01	1.251E+01	3.721E+01	9.383E+00	8.500E-06
3.146E+01	1.000E+02	2.029E+01	1.249E+01	3.277E+01	9.558E+00	1.250E-05
4.882E+01	1.000E+02	2.969E+00	1.156E+01	1.453E+01	1.187E+01	2.000E-05
6.630E+01	1.000E+02	3.798E+00	8.254E+01	8.634E+01	2.843E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 62

ESP PERFORMANCE: EFFICIENCY = 98.8164 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.08 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.639E+00 UM OUTLET SIGMAP = 3.010E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 0 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	0.4254	91.8187	5.249	8.1813	76.6317	3.048	23.3683
4.000E-07	1.530	0.253	2.3418	2.1945	86.9043	4.262	13.0957	84.2762	3.879	15.723A
7.000E-07	1.297	0.903	9.0162	7.8280	85.8735	4.103	14.1265	84.2852	3.880	15.714A
1.100E-06	1.188	0.815	7.4873	6.6169	87.0024	4.27A	12.9976	85.2823	4.01A	14.7177
1.600E-06	1.130	1.520	12.3234	10.6873	88.5295	4.540	11.4705	87.2541	4.319	12.7459
2.500E-06	1.083	3.524	23.3765	20.0558	90.6149	4.961	9.3851	89.6831	4.762	10.3169
3.500E-06	1.059	1.652	9.5059	8.0279	91.8586	5.259	8.1411	90.7519	4.992	9.2481
4.500E-06	1.046	1.652	8.8244	8.1759	92.4426	5.415	7.5574	91.0284	5.055	8.9716
6.000E-06	1.035	1.982	7.1634	7.1526	94.8866	6.234	5.1134	93.4581	5.718	6.5419
8.500E-06	1.024	3.304	8.1009	8.3825	96.5311	7.048	3.4689	95.4008	6.456	4.5992
1.250E-05	1.017	4.846	7.6993	8.1074	97.7522	7.957	2.247A	96.9672	7.329	3.032A
2.000E-05	1.010	12.115	2.3700	4.4552	99.7232	12.349	0.2768	99.3334	10.506	0.6666
2.750E-05	1.008	67.401	1.6000	7.4908	99.9664	16.771	0.0336	99.7985	13.015	0.2015

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.865E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA = 5.00
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 3.896E+00
CORRECTED SIGMAP OF EFFLUENT = 2.972E+00
LOG-NORMAL GOODNESS OF FIT = 0.993
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	4,020E-01	7,463E-01	1,148E+00	1,259E+00	2,000E-07
3,486E+00	8,104E+01	1,061E+01	2,129E+00	1,274E+01	1,671E+00	4,000E-07
3,918E+00	8,457E+01	3,550E+01	3,992E+00	3,950E+01	3,604E+00	7,000E-07
4,769E+00	8,972E+01	4,713E+01	6,237E+00	5,336E+01	3,523E+00	1,100E-06
5,911E+00	9,404E+01	7,516E+01	8,357E+00	8,352E+01	4,871E+00	1,600E-06
8,019E+00	9,782E+01	1,105E+02	1,097E+01	1,215E+02	8,251E+00	2,500E-06
1,037E+01	9,929E+01	9,584E+01	1,303E+01	1,089E+02	4,595E+00	3,500E-06
1,274E+01	9,977E+01	7,614E+01	1,425E+01	9,038E+01	5,871E+00	4,500E-06
1,630E+01	9,996E+01	5,485E+01	1,532E+01	7,017E+01	7,114E+00	6,000E-06
2,223E+01	1,000E+02	4,921E+01	1,603E+01	6,525E+01	9,383E+00	8,500E-06
3,146E+01	1,000E+02	4,583E+01	1,600E+01	6,184E+01	9,558E+00	1,250E-05
4,882E+01	1,000E+02	1,052E+01	1,482E+01	2,533E+01	1,187E+01	2,000E-05
6,630E+01	1,000E+02	2,116E+01	1,058E+02	1,269E+02	2,843E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 63

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.08 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.896E+00 UM OUTLET SIGMAP = 2.972E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 5.000E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.3449	2.1512	98.7634	9.210	1.2366	85.5517	8.056	14.4483
4.000E-07	1.530	0.253	6.4038	8.9831	97.0053	7.356	2.9947	95.6345	6.566	4.3655
7.000E-07	1.297	0.903	24.0564	15.2898	96.8480	7.249	3.1520	96.2471	6.883	3.7529
1.100E-06	1.168	0.815	16.2242	10.5709	97.6447	7.859	2.3553	97.1252	7.442	2.8748
1.600E-06	1.130	1.520	20.1366	13.0240	98.4326	8.713	1.5674	98.1009	8.311	1.8991
2.500E-06	1.083	3.524	23.1421	15.7059	99.2230	10.185	0.7770	99.0122	9.681	0.9878
3.500E-06	1.059	1.652	5.6379	4.7207	99.5962	11.557	0.4038	99.3666	10.613	0.6334
4.500E-06	1.046	1.652	3.2086	3.8013	99.7702	12.739	0.2298	99.4900	11.067	0.5100
6.000E-06	1.035	1.982	0.7054	2.8152	99.9579	16.297	0.0421	99.6852	12.079	0.3148
8.500E-06	1.024	3.304	0.0695	3.1799	99.9975	22.227	0.0025	99.7867	12.895	0.2133
1.250E-05	1.017	4.846	0.0041	3.2050	99.9999	31.459	0.0001	99.8534	13.682	0.1466
2.000E-05	1.010	12.115	0.0102	4.1380	99.9999	48.821	0.0001	99.9243	15.067	0.0757
2.750E-05	1.008	67.401	0.0565	16.4150	99.9999	66.304	0.0001	99.9460	15.776	0.0540

EFFICIENCY - STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8817
MMD OF INLET SIZE DISTRIBUTION = 8.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.833E 0
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14.131

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 99.7784
CORRECTED MMD OF EFFLUENT = 3.157E+00
CORRECTED SIGMAP OF EFFLUENT = 4.417E+00
LOG-NORMAL GOODNESS OF FIT = 0.960
CORRECTED PRECIPITATION RATE PARAMETER = 12.81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	6.077E-02	6.492E-01	7.100E-01	4.216E+00	2.000E-07
3.486E+00	8.104E+01	2.426E+00	1.111E+00	3.537E+00	3.354E+00	4.000E-07
3.918E+00	8.457E+01	7.922E+00	1.510E+00	9.432E+00	5.248E+00	7.000E-07
4.769E+00	8.972E+01	8.540E+00	1.884E+00	1.042E+01	4.094E+00	1.100E-06
5.911E+00	9.404E+01	1.027E+01	2.174E+00	1.244E+01	4.876E+00	1.600E-06
8.019E+00	9.782E+01	9.150E+00	2.483E+00	1.163E+01	7.186E+00	2.500E-06
1.037E+01	9.929E+01	4.753E+00	2.703E+00	7.456E+00	3.667E+00	3.500E-06
1.274E+01	9.977E+01	2.315E+00	2.823E+00	5.138E+00	4.476E+00	4.500E-06
1.630E+01	9.996E+01	4.517E-01	2.925E+00	3.377E+00	5.227E+00	6.000E-06
2.223E+01	1.000E+02	3.531E-02	2.991E+00	3.026E+00	6.736E+00	8.500E-06
3.146E+01	1.000E+02	2.022E-03	2.988E+00	2.990E+00	6.868E+00	1.250E-05
4.882E+01	1.000E+02	3.769E-03	2.877E+00	2.881E+00	8.869E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	3.401E+01	3.408E+01	3.518E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 64

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.157E+00 UM OUTLET SIGMAP = 4.413E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	1.6403	97.1023	7.425	2.8977	72.4365	2.702	27.5635
4.000E-07	1.530	0.253	4.0629	3.8165	94.1940	5.968	5.8060	91.6347	5.202	8.3653
7.000E-07	1.297	0.903	15.5003	11.9327	93.7940	5.828	6.2060	92.6720	5.480	7.3280
1.100E-06	1.188	0.815	11.6397	9.0142	94.8365	6.214	5.1635	93.8666	5.853	6.1334
1.600E-06	1.130	1.520	16.8762	12.7004	95.9859	6.742	4.0141	95.3665	6.441	4.6335
2.500E-06	1.083	3.524	26.2590	19.6217	97.3060	7.578	2.6940	96.9123	7.292	3.0877
3.500E-06	1.059	1.652	9.0557	7.1809	98.0181	8.221	1.9819	97.5895	7.811	2.4105
4.500E-06	1.046	1.652	7.4341	6.4053	98.3730	8.635	1.6270	97.8499	8.051	2.1501
6.000E-06	1.035	1.982	4.2085	4.5635	99.2323	10.210	0.7677	98.7232	9.143	1.2768
8.500E-06	1.024	3.304	2.9758	4.2853	99.6744	12.008	0.3256	99.2808	10.347	0.7192
1.250E-05	1.017	4.846	1.6067	3.4385	99.8801	14.103	0.1199	99.6065	11.611	0.3935
2.000E-05	1.010	12.115	0.0981	3.1518	99.9971	21.887	0.0029	99.8557	13.715	0.1443
2.750E-05	1.008	67.401	0.0185	12.2490	99.9999	66.304	0.0001	99.8992	14.467	0.1008

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.190E+00
CORRECTED SIGMAP OF EFFLUENT = 3.657E+00
LOG-NORMAL GOODNESS OF FIT = 0.978
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	1,424E-01	1,212E+00	1,354E+00	4,216E+00	2,000E-07
3,486E+00	8,104E+01	4,704E+00	2,074E+00	6,778E+00	3,354E+00	4,000E-07
3,918E+00	8,457E+01	1,560E+01	2,820E+00	1,842E+01	5,248E+00	7,000E-07
4,769E+00	8,972E+01	1,872E+01	3,517E+00	2,224E+01	4,094E+00	1,100E-06
5,911E+00	9,404E+01	2,630E-01	4,058E+00	3,036E+01	4,876E+00	1,600E-06
8,019E+00	9,782E+01	3,173E+01	4,636E+00	3,636E+01	7,186E+00	2,500E-06
1,037E+01	9,929E+01	2,333E+01	5,046E+00	2,838E+01	3,667E+00	3,500E-06
1,274E+01	9,977E+01	1,639E+01	5,270E+00	2,166E+01	4,476E+00	4,500E-06
1,630E+01	9,996E+01	8,235E+00	5,461E+00	1,370E+01	5,227E+00	6,000E-06
2,223E+01	1,000E+02	4,619E+00	5,584E+00	1,020E+01	6,736E+00	8,500E-06
3,146E+01	1,000E+02	2,444E+00	5,579E+00	8,023E+00	6,868E+00	1,250E-05
4,882E+01	1,000E+02	1,113E-01	5,371E+00	5,483E+00	8,869E+00	2,000E-05
6,630E+01	1,000E+02	6,250E-02	6,350E+01	6,356E+01	3,518E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 65

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.749E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.190E+00 UM OUTLET SIGMAP = 3.657E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	1.0971	92.7505	5.502	7.2495	43.9894	1.215	56.0106
4.000E-07	1.530	0.253	2.3354	2.5661	87.9714	4.441	12.0286	82.9121	3.704	17.0879
7.000E-07	1.297	0.903	8.8651	8.0456	87.2072	4.311	12.7928	84.9892	3.976	15.0108
1.100E-06	1.188	0.815	7.1634	6.4681	88.5468	4.543	11.4532	86.6294	4.219	13.3706
1.600E-06	1.130	1.520	11.5362	10.0274	90.1102	4.851	9.8898	88.8859	4.606	11.1141
2.500E-06	1.083	3.524	21.6945	18.4076	91.9780	5.290	8.0220	91.1998	5.096	8.8002
3.500E-06	1.059	1.652	9.0002	7.7921	92.9008	5.546	7.0992	92.0535	5.310	7.9465
4.500E-06	1.046	1.652	8.6513	7.7055	93.1761	5.629	6.8239	92.1419	5.333	7.8581
6.000E-06	1.035	1.982	7.3927	6.9020	95.1397	6.341	4.8603	94.1332	5.946	5.8668
8.500E-06	1.024	3.304	9.1127	8.5743	96.4060	6.973	3.5940	95.6279	6.562	4.3721
1.250E-05	1.017	4.846	9.0758	8.5756	97.5596	7.785	2.4404	97.0187	7.365	2.9813
2.000E-05	1.010	12.115	2.9234	4.2704	99.6856	12.081	0.3144	99.4062	10.748	0.5938
2.750E-05	1.008	67.401	2.0658	9.5682	99.9601	16.008	0.0399	99.7608	12.655	0.2392

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 3.967E+00
CORRECTED SIGMAP OF EFFLUENT = 3.337E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	3,562E-01	2.396E+00	2,752E+00	4,216E+00	2,000E-07
3,486E+00	8,104E+01	9,746E+00	4,099E+00	1,385E+01	3,354E+00	4,000E-07
3,918E+00	8,457E+01	3,215E+01	5,574E+00	3,773E+01	5,248E+00	7,000E-07
4,769E+00	8,972E+01	4,153E+01	6,952E+00	4,848E+01	4,094E+00	1,100E-06
5,911E+00	9,404E+01	6,480E+01	8,023E+00	7,283E+01	4,876E+00	1,600E-06
8,019E+00	9,782E+01	9,447E+01	9,165E+00	1,036E+02	7,186E+00	2,500E-06
1,037E+01	9,929E+01	8,357E+01	9,974E+00	9,355E+01	3,667E+00	3,500E-06
1,274E+01	9,977E+01	6,875E+01	1,042E+01	7,917E+01	4,476E+00	4,500E-06
1,630E+01	9,996E+01	5,213E+01	1,080E+01	6,293E+01	5,227E+00	6,000E-06
2,223E+01	1,000E+02	5,098E+01	1,104E+01	6,202E+01	6,736E+00	8,500E-06
3,146E+01	1,000E+02	4,976E+01	1,103E+01	6,079E+01	6,868E+00	1,250E-05
4,882E+01	1,000E+02	1,195E+01	1,062E+01	2,257E+01	8,869E+00	2,000E-05
6,630E+01	1,000E+02	2,517E+01	1,255E+02	1,507E+02	3,518E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 66

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 6.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.967E+00 UM OUTLET SIGMAP = 3.337E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1213	0.1058	83.3481	3.759	16.6519	83.3481	3.759	16.6519
4.000E-07	1.530	0.253	1.3078	1.5880	76.5857	3.044	23.4143	67.4075	2.351	32.5925
7.000E-07	1.297	0.903	4.9032	4.9767	75.4048	2.941	24.5952	71.3811	2.623	28.6189
1.100E-06	1.188	0.815	4.1624	4.1767	76.8663	3.069	23.1337	73.3880	2.776	26.6120
1.600E-06	1.130	1.520	7.1693	6.9038	78.6357	3.236	21.3643	76.4146	3.029	23.5854
2.500E-06	1.083	3.524	14.9949	14.0379	80.7263	3.452	19.2737	79.3145	3.304	20.6855
3.500E-06	1.059	1.652	6.7415	6.3695	81.5156	3.540	18.4844	79.9785	3.372	20.0215
4.500E-06	1.046	1.652	6.7972	6.5259	81.3630	3.522	18.6370	79.4868	3.321	20.5132
6.000E-06	1.035	1.982	6.8997	6.7154	84.2318	3.873	15.7682	82.4059	3.643	17.5941
8.500E-06	1.024	3.304	10.1042	9.7119	86.1477	4.145	13.8523	84.7361	3.941	15.2639
1.250E-05	1.017	4.846	12.2164	11.5719	88.5813	4.550	11.4187	87.6000	4.377	12.4000
2.000E-05	1.010	12.115	9.2214	9.2263	96.5523	7.061	3.4477	96.0454	6.773	3.9546
2.750E-05	1.008	67.401	15.3608	18.0901	98.9677	9.589	1.0323	98.6063	8.960	1.3937

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 94.8072
CORRECTED MMD OF EFFLUENT = 6.576E+00
CORRECTED SIGMAP OF EFFLUENT = 3.275E+00
LOG-NORMAL GOODNESS OF FIT = 0.987
CORRECTED PRECIPITATION RATE PARAMETER = 6.20

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E-01	4.347E+00	5.165E+00	4.216E+00	2.000E-07
3.486E+00	8.104E+01	1.897E+01	7.437E+00	2.641E+01	3.354E+00	4.000E-07
3.918E+00	8.457E+01	6.181E+01	1.011E+01	7.193E+01	5.248E+00	7.000E-07
4.769E+00	8.972E+01	8.388E+01	1.261E+01	9.649E+01	8.094E+00	1.100E-06
5.911E+00	9.404E+01	1.400E+02	1.455E+01	1.545E+02	4.876E+00	1.600E-06
8.019E+00	9.782E+01	2.270E+02	1.663E+01	2.436E+02	7.186E+00	2.500E-06
1.037E+01	9.929E+01	2.176E+02	1.809E+01	2.357E+02	3.667E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	1.890E+01	2.067E+02	4.476E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	1.959E+01	1.887E+02	5.227E+00	6.000E-06
2.223E+01	1.000E+02	1.965E+02	2.003E+01	2.165E+02	6.736E+00	8.500E-06
3.146E+01	1.000E+02	2.328E+02	2.001E+01	2.528E+02	6.868E+00	1.250E-05
4.882E+01	1.000E+02	1.310E+02	1.926E+01	1.503E+02	8.869E+00	2.000E-05
6.630E+01	1.000E+02	6.505E+02	2.277E+02	8.782E+02	3.518E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 67

ESP PERFORMANCE: EFFICIENCY = 94.8072 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 6.576E+00 UM OUTLET SIGMAP = 3.275E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.0728	0.0684	64.3675	2.164	35.6325	64.3675	2.164	35.6325
4.000E-07	1.530	0.253	0.6774	0.8489	56.7538	1.758	43.2462	42.2997	1.153	57.7003
7.000E-07	1.297	0.903	2.4961	2.6773	55.3530	1.691	44.6470	49.0164	1.412	50.9836
1.100E-06	1.188	0.815	2.1898	2.3164	56.6033	1.750	43.3967	51.1256	1.501	48.8744
1.600E-06	1.130	1.520	3.9380	4.0080	58.1548	1.827	41.8452	54.6570	1.658	45.3430
2.500E-06	1.083	3.524	8.7495	8.6737	59.8988	1.916	40.1012	57.6755	1.803	42.3245
3.500E-06	1.059	1.652	4.0669	4.0524	60.2386	1.934	39.7614	57.8179	1.810	42.1821
4.500E-06	1.046	1.652	4.1342	4.1670	59.5802	1.899	40.4198	56.6256	1.751	43.3744
6.000E-06	1.035	1.982	4.5999	4.6519	62.5155	2.057	37.4845	59.6400	1.902	40.3600
8.500E-06	1.024	3.304	7.2745	7.2598	64.4392	2.168	35.5608	62.2162	2.041	37.7838
1.250E-05	1.017	4.846	9.7411	9.5849	67.5336	2.359	32.4664	65.9883	2.261	34.0117
2.000E-05	1.010	12.115	13.0892	12.8566	82.5497	3.660	17.4503	81.7515	3.567	18.2485
2.750E-05	1.008	67.401	38.9707	38.8347	90.6614	4.971	9.3386	90.0922	4.847	9.9078

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 82.8041
CORRECTED MMD OF EFFLUENT = 1.330E+01
CORRECTED SIGMAP OF EFFLUENT = 3.950E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	6.846E+00	8.597E+00	4.216E+00	2.000E-07
3.486E+00	8.104E+01	3.504E+01	1.171E+01	4.675E+01	3.354E+00	4.000E-07
3.918E+00	8.457E+01	1.122E+02	1.593E+01	1.281E+02	5.248E+00	7.000E-07
4.769E+00	8.972E+01	1.573E+02	1.986E+01	1.772E+02	4.094E+00	1.100E-06
5.911E+00	9.404E+01	2.742E+02	2.292E+01	2.971E+02	4.476E+00	1.600E-06
8.019E+00	9.782E+01	4.722E+02	2.618E+01	4.984E+02	7.186E+00	2.500E-06
1.037E+01	9.929E+01	4.681E+02	2.850E+01	4.966E+02	3.667E+00	3.500E-06
1.274E+01	9.977E+01	4.072E+02	2.977E+01	4.370E+02	4.476E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	3.084E+01	4.329E+02	5.227E+00	6.000E-06
2.223E+01	1.000E+02	5.045E+02	3.154E+01	5.360E+02	6.736E+00	8.500E-06
3.146E+01	1.000E+02	6.620E+02	3.151E+01	6.935E+02	6.868E+00	1.250E-05
4.882E+01	1.000E+02	6.632E+02	3.034E+01	6.935E+02	8.869E+00	2.000E-05
6.630E+01	1.000E+02	5.884E+03	3.586E+02	6.243E+03	3.518E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 68

ESP PERFORMANCE: EFFICIENCY = 82.6041 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.330E+01 UM OUTLET SIGMAP = 3.950E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.2914	1.7874	97.6762	7.888	2.3238	76.9750	3.079	23.0250
4.000E-07	1.530	0.253	4.7115	4.1953	95.0987	6.323	4.9013	92.9508	5.561	7.0492
7.000E-07	1.297	0.903	17.8491	13.0509	94.7976	6.198	5.2024	93.8560	5.849	6.1440
1.100E-06	1.188	0.815	12.9822	9.5981	95.8076	6.650	4.1924	94.9936	6.278	5.0064
1.600E-06	1.130	1.520	18.0331	13.0232	96.8775	7.268	3.1225	96.3577	6.945	3.6423
2.500E-06	1.083	3.524	26.0236	18.8506	98.0564	8.262	1.9436	97.7260	7.933	2.2740
3.500E-06	1.059	1.652	8.3261	6.5527	98.6735	9.063	1.3265	98.3138	8.560	1.6862
4.500E-06	1.046	1.652	6.3882	5.6613	98.9823	9.619	1.0177	98.5432	8.867	1.4568
6.000E-06	1.035	1.982	3.0611	3.8874	99.5935	11.543	0.4065	99.1662	10.037	0.8338
8.500E-06	1.024	3.304	1.6599	3.5952	99.8678	13.898	0.1322	99.5374	11.272	0.4626
1.250E-05	1.017	4.846	0.6293	3.0073	99.9658	16.735	0.0342	99.7362	12.449	0.2638
2.000E-05	1.010	12.115	0.0192	3.3806	99.9996	48.821	0.0004	99.8814	14.125	0.1186
2.750E-05	1.008	67.401	0.0254	13.4101	99.9999	66.304	0.0001	99.9154	14.835	0.0846

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 3.123E+00
CORRECTED SIGMAP OF EFFLUENT = 3.837E+00
LOG-NORMAL GOODNESS OF FIT = 0.972
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.142E-01	1.017E+00	1.131E+00	4.216E+00	2.000E-07
3.486E+00	8.104E+01	3.971E+00	1.740E+00	5.712E+00	3.354E+00	4.000E-07
3.918E+00	8.457E+01	1.308E+01	2.367E+00	1.544E+01	5.248E+00	7.000E-07
4.769E+00	8.972E+01	1.520E+01	2.951E+00	1.815E+01	4.094E+00	1.100E-06
5.911E+00	9.404E+01	2.046E+01	3.406E+00	2.387E+01	4.876E+00	1.600E-06
8.019E+00	9.782E+01	2.289E+01	3.891E+00	2.678E+01	7.186E+00	2.500E-06
1.037E+01	9.929E+01	1.562E+01	4.235E+00	1.985E+01	3.667E+00	3.500E-06
1.274E+01	9.977E+01	1.025E+01	4.423E+00	1.468E+01	4.476E+00	4.500E-06
1.630E+01	9.996E+01	4.360E+00	4.584E+00	8.944E+00	5.227E+00	6.000E-06
2.223E+01	1.000E+02	1.876E+00	4.686E+00	6.562E+00	6.736E+00	8.500E-06
3.146E+01	1.000E+02	6.968E-01	4.682E+00	5.379E+00	6.868E+00	1.250E-05
4.882E+01	1.000E+02	1.587E-02	4.508E+00	4.524E+00	8.869E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	5.330E+01	5.336E+01	3.51AE+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 69

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.123E+00 UM OUTLET SIGMAP = 3.837E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	1.4757	96.1885	6.850	3.8115	65.9749	2.260	34.0251
4.000E-07	1.530	0.253	3.4620	3.4302	92.8186	5.522	7.1814	89.6837	4.763	10.3163
7.000E-07	1.297	0.903	13.2808	10.7913	92.2814	5.371	7.7186	90.9070	5.027	9.0930
1.100E-06	1.188	0.815	10.3039	8.3796	93.3448	5.688	6.6352	92.1768	5.343	7.8232
1.600E-06	1.130	1.520	15.5806	12.2621	94.6205	6.128	5.3795	93.8618	5.851	6.1382
2.500E-06	1.083	3.524	25.9676	20.1442	96.1328	6.820	3.8672	95.6506	6.573	4.3494
3.500E-06	1.059	1.652	9.5269	7.7110	96.9735	7.334	3.0265	96.4484	6.998	3.5516
4.500E-06	1.046	1.652	8.2266	7.0655	97.3866	7.641	2.6134	96.7457	7.182	3.2543
6.000E-06	1.035	1.982	5.3236	5.2964	98.5904	8.936	1.4096	97.9667	8.168	2.0333
8.500E-06	1.024	3.304	4.5539	5.2346	99.2766	10.335	0.7234	98.7945	9.264	1.2055
1.250E-05	1.017	4.846	3.1180	4.2852	99.6623	11.932	0.3377	99.3272	10.486	0.6728
2.000E-05	1.010	12.115	0.3371	2.9891	99.9854	18.517	0.0146	99.8123	13.163	0.1877
2.750E-05	1.008	67.401	0.0794	10.9351	99.9994	66.304	0.0006	99.8766	14.042	0.1234

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.283E+00
CORRECTED SIGMAP OF EFFLUENT = 3.486E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	1.485E+00	1.672E+00	4.216E+00	2.000E-07
3.486E+00	8.104E+01	5.819E+00	2.540E+00	8.359E+00	3.354E+00	4.000E-07
3.918E+00	8.457E+01	1.940E+01	3.454E+00	2.285E+01	5.248E+00	7.000E-07
4.769E+00	8.972E+01	2.406E+01	4.308E+00	2.837E+01	4.094E+00	1.100E-06
5.911E+00	9.404E+01	3.525E+01	4.971E+00	4.022E+01	4.876E+00	1.600E-06
8.019E+00	9.782E+01	4.554E+01	5.679E+00	5.122E+01	7.186E+00	2.500E-06
1.037E+01	9.929E+01	3.563E+01	6.180E+00	4.181E+01	3.667E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	6.456E+00	3.278E+01	4.476E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	6.690E+00	2.181E+01	5.227E+00	6.000E-06
2.223E+01	1.000E+02	1.026E+01	6.840E+00	1.710E+01	6.736E+00	8.500E-06
3.146E+01	1.000E+02	6.885E+00	6.834E+00	1.372E+01	6.868E+00	1.250E-05
4.882E+01	1.000E+02	5.550E-01	6.580E+00	7.135E+00	8.869E+00	2.000E-05
6.630E+01	1.000E+02	3.894E-01	7.778E+01	7.817E+01	3.518E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 70

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.283E+00 UM OUTLET SIGMAP = 3.486E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.40

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	1.2609	94.3710	6.033	5.6290	54.6971	1.660	45.3029
4.000E-07	1.530	0.253	2.8175	2.9580	90.2545	4.882	9.7455	86.1381	4.143	13.8619
7.000E-07	1.297	0.903	10.2492	9.3821	89.4860	4.723	10.5140	87.6813	4.391	12.3187
1.100E-06	1.188	0.815	8.7455	7.5273	90.6096	4.960	9.3904	89.0495	4.637	10.9505
1.600E-06	1.130	1.520	13.8731	11.5167	92.0129	5.299	7.9871	91.0167	5.053	8.9833
2.500E-06	1.083	3.524	24.9052	20.2642	93.8154	5.835	6.1846	93.1822	5.631	6.8178
3.500E-06	1.059	1.652	9.7131	8.1296	94.8548	6.221	5.1452	94.1654	5.957	5.8346
4.500E-06	1.046	1.652	8.7730	7.6477	95.3527	6.434	4.6473	94.5113	6.086	5.4887
6.000E-06	1.035	1.982	6.4826	6.1537	97.1378	7.451	2.8622	96.3189	6.923	3.6811
8.500E-06	1.024	3.304	6.5732	6.6158	98.2590	8.493	1.7410	97.6259	7.843	2.3741
1.250E-05	1.017	4.846	5.5095	5.8653	99.0051	9.666	0.9949	98.5650	8.898	1.4350
2.000E-05	1.010	12.115	1.0816	3.1213	99.9219	15.001	0.0781	99.6945	12.142	0.3055
2.750E-05	1.008	67.401	0.4642	9.5575	99.9940	20.373	0.0060	99.8319	13.394	0.1681

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 98.8148
CORRECTED MMD OF EFFLUENT = 3.475E+00
CORRECTED SIGMAP OF EFFLUENT = 3.326E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	2,766E+01	1,950E+00	2,226E+00	4,216E+00	2,000E-07
3,486E+00	8,104E+01	7,896E+00	3,335E+00	1,123E+01	3,354E+00	4,000E-07
3,918E+00	8,457E+01	2,642E+01	4,536E+00	3,096E+01	5,248E+00	7,000E-07
4,769E+00	8,972E+01	3,405E+01	5,656E+00	3,970E+01	4,094E+00	1,100E-06
5,911E+00	9,404E+01	5,234E+01	6,528E+00	5,886E+01	4,876E+00	1,600E-06
8,019E+00	9,782E+01	7,283E+01	7,457E+00	8,029E+01	7,186E+00	2,300E-06
1,037E+01	9,929E+01	6,057E+01	8,116E+00	6,869E+01	3,667E+00	3,500E-06
1,274E+01	9,977E+01	4,682E+01	8,477E+00	5,530E+01	4,476E+00	4,500E-06
1,630E+01	9,996E+01	3,070E+01	8,784E+00	3,949E+01	5,227E+00	6,000E-06
2,223E+01	1,000E+02	2,470E+01	8,981E+00	3,368E+01	6,736E+00	8,500E-06
3,146E+01	1,000E+02	2,029E+01	8,973E+00	2,926E+01	6,868E+00	1,250E-05
4,882E+01	1,000E+02	2,969E+00	8,640E+00	1,161E+01	8,869E+00	2,000E-05
6,630E+01	1,000E+02	3,798E+00	1,021E+02	1,059E+02	3,518E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 71

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.475E+00 UM OUTLET SIGMAP = 3.326E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	1.0745	91.8187	5.249	8.1813	40.9731	1.105	59.0269
4.000E-07	1.530	0.253	2.3418	2.5640	86.9043	4.262	13.0957	81.6286	3.553	18.3714
7.000E-07	1.297	0.903	9.0162	8.1889	85.8735	4.103	14.1265	83.5607	3.786	16.4393
1.100E-06	1.188	0.815	7.4873	6.7424	87.0024	4.278	12.9976	85.0031	3.978	14.9969
1.600E-06	1.130	1.520	12.3234	10.6884	88.5295	4.540	11.4705	87.2528	4.319	12.7472
2.500E-06	1.083	3.524	23.3765	19.8220	90.6149	4.961	9.3851	89.8034	4.787	10.1966
3.500E-06	1.059	1.652	9.5059	8.2242	91.8589	5.259	8.1411	90.9754	5.043	9.0246
4.500E-06	1.046	1.652	8.8244	7.8698	92.4426	5.415	7.5574	91.3642	5.135	8.6358
6.000E-06	1.035	1.982	7.1634	6.7382	94.8866	6.234	5.1134	93.8371	5.843	6.1629
8.500E-06	1.024	3.304	8.1009	7.8013	96.5311	7.048	3.4689	95.7197	6.607	4.2803
1.250E-05	1.017	4.846	7.6993	7.5167	97.7522	7.957	2.2478	97.1881	7.488	2.8119
2.000E-05	1.010	12.115	2.3700	3.7968	99.7232	12.349	0.2768	99.4319	10.841	0.5681
2.750E-05	1.008	67.401	1.6000	8.9728	99.9664	16.771	0.0336	99.7587	12.636	0.2413

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =10.00
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 3.755E+00
CORRECTED SIGMAP OF EFFLUENT = 3.253E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	4,020E-01	2,499E+00	2,901E+00	4,216E+00	2,000E-07
3,486E+00	8,104E+01	1,061E+01	4,275E+00	1,489E+01	3,354E+00	4,000E-07
3,918E+00	8,457E+01	3,550E+01	5,813E+00	4,132E+01	5,248E+00	7,000E-07
4,769E+00	8,972E+01	4,713E+01	7,249E+00	5,438E+01	4,094E+00	1,100E-06
5,911E+00	9,404E+01	7,516E+01	8,366E+00	8,353E+01	4,876E+00	1,600E-06
8,019E+00	9,782E+01	1,105E+02	9,556E+00	1,201E+02	7,186E+00	2,500E-06
1,037E+01	9,929E+01	9,584E+01	1,040E+01	1,062E+02	3,667E+00	3,500E-06
1,274E+01	9,977E+01	7,614E+01	1,086E+01	8,700E+01	4,476E+00	4,500E-06
1,630E+01	9,996E+01	5,485E+01	1,126E+01	6,611E+01	5,227E+00	6,000E-06
2,223E+01	1,000E+02	4,921E+01	1,151E+01	6,072E+01	6,736E+00	8,500E-06
3,148E+01	1,000E+02	4,583E+01	1,150E+01	5,733E+01	6,868E+00	1,250E-05
4,882E+01	1,000E+02	1,052E+01	1,107E+01	2,159E+01	8,869E+00	2,000E-05
6,630E+01	1,000E+02	2,116E+01	1,309E+02	1,521E+02	3,518E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 72

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.755E+00 UM OUTLET SIGMAP = 3.253E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.000E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	COF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2,000E-07	2,123	0,033	0,3449	2,7951	98,7634	9,210	1,2366	81,2269	3,507	18,7731
4,000E-07	1,530	0,253	6,4038	5,2171	97,0053	7,356	2,9947	95,4295	6,469	4,5705
7,000E-07	1,297	0,903	24,0564	15,4264	96,8480	7,249	3,1520	96,2135	6,864	3,7865
1,100E-06	1,188	0,815	16,2242	10,5587	97,6447	7,859	2,3553	97,1285	7,444	2,8715
1,600E-06	1,130	1,520	20,1366	12,921A	98,4326	8,713	1,5674	98,1158	8,327	1,8842
2,500E-06	1,083	3,524	23,1421	15,4393	99,2230	10,185	0,7770	99,0289	9,717	0,9711
3,500E-06	1,059	1,652	5,6379	4,5483	99,5962	11,557	0,4038	99,3898	10,691	0,6102
4,500E-06	1,046	1,652	3,2086	3,56A4	99,7702	12,739	0,2298	99,5212	11,200	0,478A
6,000E-06	1,035	1,982	0,7054	2,5219	99,9579	16,297	0,0421	99,7180	12,310	0,2820
8,500E-06	1,024	3,304	0,0695	2,7851	99,9975	22,227	0,0025	99,8132	13,173	0,1868
1,250E-05	1,017	4,846	0,0041	2,8031	99,9999	31,459	0,0001	99,8718	13,962	0,1282
2,000E-05	1,010	12,115	0,0102	3,6572	99,9999	48,821	0,0001	99,9331	15,326	0,0669
2,750E-05	1,008	67,401	0,0565	17,7578	99,9999	66,304	0,0001	99,9416	15,611	0,0584

EFFICIENCY = STATED = 99,60 COMPUTED = 99,5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99,8817
MMD OF INLET SIZE DISTRIBUTION = 4,465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5,122E+00
LOG-NORMAL GOODNESS OF FIT = 0,984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1,364E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1,833E+00
LOG-NORMAL GOODNESS OF FIT = 0,996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 14,131

SIGMAG= 0,000 WITH 0,000 SNEAKAGE OVER 4,000 STAGES
NTEMP = 1
RMMD = 10,00
RSIGMA =15,00
CORR. EFF. = 99,7784
CORRECTED MMD OF EFFLUENT = 3,086E+00
CORRECTED SIGMAP OF EFFLUENT = 4,730E+00
LOG-NORMAL GOODNESS OF FIT = 0,957
CORRECTED PRECIPITATION RATE PARAMETER = 12,81

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3,790E+00	8,360E+01	6,077E-02	8,618E-01	9,225E-01	5,596E+00	2,000E-07
3,486E+00	8,104E+01	2,426E+00	1,277E+00	3,703E+00	3,855E+00	4,000E-07
3,918E+00	8,457E+01	7,922E+00	1,595E+00	9,516E+00	5,540E+00	7,000E-07
4,769E+00	8,972E+01	8,540E+00	1,872E+00	1,041E+01	4,061E+00	1,100E-06
5,911E+00	9,404E+01	1,027E+01	2,076E+00	1,235E+01	4,657E+00	1,600E-06
8,019E+00	9,782E+01	9,150E+00	2,286E+00	1,144E+01	6,614E+00	2,500E-06
1,037E+01	9,929E+01	4,753E+00	2,430E+00	7,184E+00	3,298E+00	3,500E-06
1,274E+01	9,977E+01	2,315E+00	2,508E+00	4,823E+00	3,977E+00	4,500E-06
1,630E+01	9,996E+01	4,517E-01	2,573E+00	3,025E+00	4,598E+00	6,000E-06
2,223E+01	1,000E+02	3,531E-02	2,615E+00	2,650E+00	5,890E+00	8,500E-06
3,146E+01	1,000E+02	2,022E-03	2,613E+00	2,615E+00	6,007E+00	1,250E-05
4,882E+01	1,000E+02	3,769E-03	2,543E+00	2,547E+00	7,838E+00	2,000E-05
6,630E+01	1,000E+02	6,250E-02	3,680E+01	3,686E+01	3,806E+01	2,750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 73

ESP PERFORMANCE: EFFICIENCY = 99.7784 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.086E+00 UM OUTLET SIGMAP = 4.730E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2645	2.1208	97.1023	7.425	2.8977	64.3624	2.163	35.6376
4.000E-07	1.530	0.253	4.0629	3.9911	94.1940	5.968	5.8060	91.2520	5.108	8.7480
7.000E-07	1.297	0.903	15.5003	12.0346	93.7940	5.828	6.2060	92.6094	5.462	7.3906
1.100E-06	1.188	0.815	11.6397	9.0051	94.8365	6.214	5.1635	93.8727	5.855	6.1273
1.600E-06	1.130	1.520	16.8762	12.6241	95.9859	6.742	4.0141	95.3944	6.453	4.6056
2.500E-06	1.083	3.524	26.2590	19.4228	97.3060	7.578	2.6940	96.9436	7.313	3.0564
3.500E-06	1.059	1.652	9.0557	7.0522	98.0181	8.221	1.9819	97.6327	7.849	2.3673
4.500E-06	1.046	1.652	7.4341	6.2315	98.3730	8.635	1.6270	97.9082	8.108	2.0918
6.000E-06	1.035	1.982	4.2085	4.3447	99.2323	10.210	0.7677	98.7844	9.246	1.2156
8.500E-06	1.024	3.304	2.9758	3.9906	99.6744	12.008	0.3256	99.3302	10.496	0.6698
1.250E-05	1.017	4.846	1.6067	3.1387	99.8801	14.103	0.1199	99.6408	11.803	0.3592
2.000E-05	1.010	12.115	0.0981	2.7929	99.9971	21.887	0.0029	99.8722	13.968	0.1278
2.750E-05	1.008	67.401	0.0185	13.2508	99.9999	66.304	0.0001	99.8910	14.302	0.1090

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.6385
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.934E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.789

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 99.4455
CORRECTED MMD OF EFFLUENT = 3.137E+00
CORRECTED SIGMAP OF EFFLUENT = 3.836E+00
LOG-NORMAL GOODNESS OF FIT = 0.977
CORRECTED PRECIPITATION RATE PARAMETER = 10.89

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.424E-01	1.609E+00	1.751E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	4.704E+00	2.384E+00	7.088E+00	3.855E+00	4.000E-07
3.918E+00	8.457E+01	1.540E+01	2.977E+00	1.837E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	1.872E+01	3.494E+00	2.222E+01	4.064E+00	1.100E-06
5.911E+00	9.404E+01	2.630E+01	3.876E+00	3.018E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	3.173E+01	4.267E+00	3.599E+01	6.614E+00	2.500E-06
1.037E+01	9.929E+01	2.333E+01	4.537E+00	2.787E+01	3.298E+00	3.500E-06
1.274E+01	9.977E+01	1.639E+01	4.683E+00	2.107E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	8.235E+00	4.805E+00	1.304E+01	4.598E+00	6.000E-06
2.223E+01	1.000E+02	4.619E+00	4.882E+00	9.502E+00	5.890E+00	8.500E-06
3.146E+01	1.000E+02	2.484E+00	4.879E+00	7.323E+00	6.007E+00	1.250E-05
4.882E+01	1.000E+02	1.113E+01	4.747E+00	4.858E+00	7.834E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	6.870E+01	6.876E+01	3.806E+01	2.750E-05

SUMMARY [illegible] OF ESP OPERATING
PARAME [illegible] ND PERFORMANCE

DATA SET NUMBER 74

ESP PERFORMANCE: EFFICIENCY = 99.4455 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.137E+00 UM OUTLET SIGMAP = 3.836E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 3 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1836	1.4098	92.7505	5.502	7.2495	28.0279	0.690	71.9721
4.000E-07	1.530	0.253	2.3354	2.6797	87.9714	4.441	12.0286	82.1555	3.614	17.8445
7.000E-07	1.297	0.903	8.8651	8.1119	87.2072	4.311	12.7928	84.8655	3.959	15.1345
1.100E-06	1.188	0.815	7.1634	6.4622	88.5468	4.543	11.4532	86.6415	4.221	13.3585
1.600E-06	1.130	1.520	11.5362	9.9778	90.1102	4.851	9.8898	88.9409	4.617	11.0591
2.500E-06	1.083	3.524	21.6945	18.2781	91.9780	5.290	8.0220	91.2617	5.111	8.7383
3.500E-06	1.059	1.652	9.0002	7.7084	92.9008	5.546	7.0992	92.1389	5.332	7.8611
4.500E-06	1.046	1.652	8.6513	7.5924	93.1761	5.629	6.8239	92.2572	5.364	7.7428
6.000E-06	1.035	1.982	7.3927	6.7596	95.1397	6.341	4.8603	94.2542	5.990	5.7458
8.500E-06	1.024	3.304	9.1127	8.3826	96.4060	6.973	3.5940	95.7257	6.610	4.2743
1.250E-05	1.017	4.846	9.0758	8.3805	97.5596	7.785	2.4404	97.0865	7.413	2.9135
2.000E-05	1.010	12.115	2.9234	4.0369	99.6856	12.081	0.3144	99.4386	10.866	0.5614
2.750E-05	1.008	67.401	2.0658	10.2201	99.9601	16.408	0.0399	99.7445	12.517	0.2555

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.6969
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.287E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.550E+00
LOG-NORMAL GOODNESS OF FIT = 0.995
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.101

SIGMAG= 0.250 WITH 0.300 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 98.3153
CORRECTED MMD OF EFFLUENT = 3.936E+00
CORRECTED SIGMAP OF EFFLUENT = 3.456E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
CORRECTED PRECIPITATION RATE PARAMETER = 8.56

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	3.562E-01	3.180E+00	3.537E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	9.746E+00	4.712E+00	1.446E+01	3.855E+00	4.000E-07
3.918E+00	8.457E+01	3.215E+01	5.885E+00	3.804E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	4.153E+01	6.908E+00	4.844E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	6.480E+01	7.662E+00	7.247E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	9.447E+01	8.436E+00	1.029E+02	6.614E+00	2.500E-06
1.037E+01	9.929E+01	8.357E+01	8.970E+00	9.254E+01	3.298E+00	3.500E-06
1.274E+01	9.977E+01	6.875E+01	9.257E+00	7.800E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	5.213E+01	9.498E+00	6.163E+01	4.598E+00	6.000E-06
2.223E+01	1.000E+02	5.09AE+01	9.652E+00	6.064E+01	5.890E+00	8.500E-06
3.146E+01	1.000E+02	4.976E+01	9.645E+00	5.940E+01	6.007E+00	1.250E-05
4.882E+01	1.000E+02	1.195E+01	9.385E+00	2.133E+01	7.838E+00	2.000E-05
6.630E+01	1.000E+02	2.517E+01	1.358E+02	1.610E+02	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 75

ESP PERFORMANCE: EFFICIENCY = 98.3153 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.936E+00 UM OUTLET SIGMAP = 3.456E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.30 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 4 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
2.000E-07	2.123	0.033	0.1213	0.1060	83.3481	3.759	16.6519	83.3481	3.759	16.6519
4.000E-07	1.530	0.253	1.3078	1.6579	76.5857	3.044	23.4143	66.0350	2.264	33.9650
7.000E-07	1.297	0.903	4.9032	5.0250	75.4048	2.941	24.5952	71.1566	2.607	28.8434
1.100E-06	1.188	0.815	4.1624	4.1810	76.8663	3.069	23.1337	73.4100	2.777	26.5900
1.600E-06	1.130	1.520	7.1693	6.8872	78.6357	3.236	21.3643	76.5144	3.038	23.4856
2.500E-06	1.083	3.524	14.9949	13.9875	80.7263	3.452	19.2737	79.4267	3.315	20.5733
3.500E-06	1.059	1.652	6.7415	6.3319	81.5156	3.540	18.4844	80.1334	3.389	19.8666
4.500E-06	1.046	1.652	6.7972	6.4713	81.3630	3.522	18.6370	79.6961	3.343	20.3039
6.000E-06	1.035	1.982	6.8997	6.6438	84.2318	3.873	15.7682	82.6254	3.670	17.3746
8.500E-06	1.024	3.304	10.1042	9.6168	86.1477	4.145	13.8523	84.9135	3.966	15.0865
1.250E-05	1.017	4.846	12.2164	11.4782	88.5813	4.550	11.4187	87.7231	4.398	12.2769
2.000E-05	1.010	12.115	9.2214	9.1056	96.5523	7.061	3.4477	96.1043	6.804	3.8957
2.750E-05	1.008	67.401	15.3608	18.5079	98.9677	9.589	1.0323	98.5767	8.916	1.4233

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 95.4704
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 6.224E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.152E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 6.488

SIGMAG= 0.250 WITH 0.500 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 94.8168
CORRECTED MMD OF EFFLUENT = 6.604E+00
CORRECTED SIGMAP OF EFFLUENT = 3.299E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
CORRECTED PRECIPITATION RATE PARAMETER = 6.21

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	8.183E-01	5.770E+00	6.588E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	1.897E+01	8.549E+00	2.752E+01	3.855E+00	4.000E-07
3.918E+00	8.457E+01	6.181E+01	1.068E+01	7.249E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	8.388E+01	1.253E+01	9.641E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	1.400E+02	1.390E+01	1.539E+02	4.657E+00	1.600E-06
8.019E+00	9.782E+01	2.270E+02	1.530E+01	2.423E+02	6.614E+00	2.500E-06
1.037E+01	9.929E+01	2.17AE+02	1.627E+01	2.339E+02	3.298E+00	3.500E-06
1.274E+01	9.977E+01	1.878E+02	1.679E+01	2.045E+02	3.977E+00	4.500E-06
1.630E+01	9.996E+01	1.691E+02	1.723E+01	1.864E+02	4.598E+00	6.000E-06
2.223E+01	1.000E+02	1.965E+02	1.751E+01	2.140E+02	5.890E+00	8.500E-06
3.146E+01	1.000E+02	2.328E+02	1.750E+01	2.503E+02	6.007E+00	1.250E-05
4.882E+01	1.000E+02	1.310E+02	1.702E+01	1.481E+02	7.838E+00	2.000E-05
6.630E+01	1.000E+02	6.505E+02	2.464E+02	8.96AE+02	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 76

ESP PERFORMANCE: EFFICIENCY = 94.8168 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 6.604E+00 UM OUTLET SIGMAP = 3.209E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.50 /SECTION GAS VELOCITY SIGMAG = 0.25
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 5 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.0728	0.0684	64.3675	2.164	35.6325	64.3675	2.164	35.6325
4.000E-07	1.530	0.253	0.6774	0.8815	56.7538	1.758	43.2462	40.1384	1.076	59.8616
7.000E-07	1.297	0.903	2.4961	2.6982	55.3530	1.691	44.6470	48.6629	1.398	51.3371
1.100E-06	1.188	0.815	2.1898	2.3168	56.6033	1.750	43.3967	51.1603	1.503	48.8397
1.600E-06	1.130	1.520	3.9380	3.9976	58.1548	1.827	41.8452	54.8142	1.666	45.1858
2.500E-06	1.083	3.524	8.7495	8.6450	59.8988	1.916	40.1012	57.8523	1.812	42.1477
3.500E-06	1.059	1.652	4.0669	4.0325	60.2386	1.934	39.7614	58.0618	1.822	41.9382
4.500E-06	1.046	1.652	4.1342	4.1389	59.5802	1.899	40.4198	56.9552	1.767	43.0448
6.000E-06	1.035	1.982	4.5999	4.6161	62.5155	2.057	37.4845	59.9858	1.920	40.0142
8.500E-06	1.024	3.304	7.2745	7.2124	64.4392	2.168	35.5608	62.4954	2.056	37.5046
1.250E-05	1.017	4.846	9.7411	9.5386	67.5336	2.359	32.4664	66.1821	2.273	33.8179
2.000E-05	1.010	12.115	13.0892	12.8025	82.5497	3.660	17.4503	81.8442	3.577	18.1558
2.750E-05	1.008	67.401	38.9707	39.0513	90.6614	4.971	9.3386	90.0456	4.837	9.9544

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 83.8485
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.352E+01
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.903E+00
LOG-NORMAL GOODNESS OF FIT = 0.986
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 3.823

SIGMAG= 0.250 WITH 0.700 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 82.8192
CORRECTED MMD OF EFFLUENT = 1.336E+01
CORRECTED SIGMAP OF EFFLUENT = 3.973E+00
LOG-NORMAL GOODNESS OF FIT = 0.983
CORRECTED PRECIPITATION RATE PARAMETER = 3.69

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.751E+00	9.086E+00	1.084E+01	5.596E+00	2.000E-07
3.486E+00	8.104E+01	3.504E+01	1.346E+01	4.850E+01	3.855E+00	4.000E-07
3.918E+00	8.457E+01	1.122E+02	1.681E+01	1.290E+02	5.540E+00	7.000E-07
4.769E+00	8.972E+01	1.573E+02	1.974E+01	1.771E+02	4.068E+00	1.100E-06
5.911E+00	9.404E+01	2.742E+02	2.189E+01	2.961E+02	4.657E+00	1.600E-06
8.019E+00	9.782E+01	4.722E+02	2.410E+01	4.963E+02	6.614E+00	2.500E-06
1.037E+01	9.929E+01	4.681E+02	2.563E+01	4.937E+02	3.298E+00	3.500E-06
1.274E+01	9.977E+01	4.072E+02	2.645E+01	4.336E+02	3.977E+00	4.500E-06
1.630E+01	9.996E+01	4.021E+02	2.714E+01	4.292E+02	4.598E+00	6.000E-06
2.223E+01	1.000E+02	5.045E+02	2.757E+01	5.320E+02	5.890E+00	8.500E-06
3.146E+01	1.000E+02	6.620E+02	2.756E+01	6.895E+02	6.007E+00	1.250E-05
4.882E+01	1.000E+02	6.632E+02	2.681E+01	6.900E+02	7.838E+00	2.000E-05
6.630E+01	1.000E+02	5.884E+03	3.880E+02	6.272E+03	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 77

ESP PERFORMANCE: EFFICIENCY = 82.8192 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 1.336E+01 UM OUTLET SIGMAP = 3.973E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.70 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 6 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2914	2.3134	97.6762	7.488	2.3238	70.1986	2.538	29.8014
4.000E-07	1.530	0.253	4.7115	4.3864	95.0987	6.323	4.9013	92.6296	5.468	7.3704
7.000E-07	1.297	0.903	17.8491	13.1625	94.7976	6.198	5.2024	93.8034	5.831	6.1966
1.100E-06	1.188	0.815	12.9822	9.5882	95.8076	6.650	4.1924	94.9987	6.281	5.0013
1.600E-06	1.130	1.520	18.0331	12.9396	96.8775	7.268	3.1225	96.3811	6.959	3.6189
2.500E-06	1.083	3.524	26.0236	18.6327	98.0564	8.262	1.9436	97.7523	7.957	2.2477
3.500E-06	1.059	1.652	8.3261	6.4119	98.6735	9.063	1.3265	98.3500	8.606	1.6500
4.500E-06	1.046	1.652	6.3882	5.4709	98.9823	9.619	1.0177	98.5922	8.938	1.4078
6.000E-06	1.035	1.982	3.0611	3.6478	99.5935	11.583	0.4065	99.2176	10.170	0.7824
8.500E-06	1.024	3.304	1.6599	3.2726	99.8678	13.898	0.1322	99.5789	11.469	0.4211
1.250E-05	1.017	4.846	0.6293	2.6790	99.9658	16.735	0.0342	99.7650	12.692	0.2350
2.000E-05	1.010	12.115	0.0192	2.9877	99.9996	48.821	0.0004	99.8952	14.384	0.1048
2.750E-05	1.008	67.401	0.0254	14.5072	99.9999	66.304	0.0001	99.9085	14.670	0.0915

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.7368
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.707E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.987E+00
LOG-NORMAL GOODNESS OF FIT = 0.997
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 12.454

SIGMAG= 0.100 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 99.5749
CORRECTED MMD OF EFFLUENT = 3.065E+00
CORRECTED SIGMAP OF EFFLUENT = 4.045E+00
LOG-NORMAL GOODNESS OF FIT = 0.970
CORRECTED PRECIPITATION RATE PARAMETER = 11.45

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.142E-01	1.350E+00	1.464E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	3.971E+00	2.001E+00	5.972E+00	3.855E+00	4.000E-07
3.918E+00	8.457E+01	1.308E+01	2.499E+00	1.557E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	1.520E+01	2.933E+00	1.813E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	2.046E+01	3.253E+00	2.371E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	2.289E+01	3.581E+00	2.647E+01	6.614E+00	2.500E-06
1.037E+01	9.929E+01	1.562E+01	3.808E+00	1.942E+01	3.298E+00	3.500E-06
1.274E+01	9.977E+01	1.025E+01	3.930E+00	1.418E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	4.360E+00	4.032E+00	8.393E+00	4.598E+00	6.000E-06
2.223E+01	1.000E+02	1.876E+00	4.098E+00	5.973E+00	5.890E+00	8.500E-06
3.146E+01	1.000E+02	6.968E-01	4.095E+00	4.792E+00	6.007E+00	1.250E-05
4.882E+01	1.000E+02	1.587E-02	3.984E+00	4.000E+00	7.838E+00	2.000E-05
6.630E+01	1.000E+02	6.250E-02	5.765E+01	5.772E+01	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 78

ESP PERFORMANCE: EFFICIENCY = 99.5749 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.065E+00 UM OUTLET SIGMAP = 4.045E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.10
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 7 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2397	1.9046	96.1885	6.850	3.8115	56.0848	1.725	43.9152
4.000E-07	1.530	0.253	3.4620	3.5861	92.8186	5.522	7.1814	89.2149	4.669	10.7851
7.000E-07	1.297	0.903	13.2808	10.8823	92.2814	5.371	7.7186	90.8304	5.010	9.1696
1.100E-06	1.188	0.815	10.3039	8.3715	93.3648	5.688	6.6352	92.1843	5.345	7.8157
1.600E-06	1.130	1.520	15.5806	12.1940	94.6205	6.128	5.3795	93.8959	5.863	6.1041
2.500E-06	1.083	3.524	25.9676	19.9667	96.1328	6.820	3.8672	95.6889	6.592	4.3111
3.500E-06	1.059	1.652	9.5269	7.5961	96.9735	7.334	3.0265	96.5013	7.030	3.4987
4.500E-06	1.046	1.652	8.2266	6.9103	97.3866	7.641	2.6134	96.8172	7.228	3.1828
6.000E-06	1.035	1.982	5.3236	5.1011	98.5904	8.936	1.4096	98.0417	8.246	1.9583
8.500E-06	1.024	3.304	4.5539	4.9716	99.2766	10.335	0.7234	98.8551	9.372	1.1449
1.250E-05	1.017	4.846	3.1180	4.0175	99.6623	11.932	0.3377	99.3692	10.622	0.6308
2.000E-05	1.010	12.115	0.3371	2.6688	99.9854	18.517	0.0146	99.8324	13.400	0.1676
2.750E-05	1.008	67.401	0.0794	11.8294	99.9994	66.304	0.0006	99.8665	13.877	0.1335

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.4752
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.195E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.189E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 11.007

SIGMAG= 0.400 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 99.2391
CORRECTED MMD OF EFFLUENT = 3.236E+00
CORRECTED SIGMAP OF EFFLUENT = 3.639E+00
LOG-NORMAL GOODNESS OF FIT = 0.983
CORRECTED PRECIPITATION RATE PARAMETER = 10.23

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	1.873E-01	1.971E+00	2.158E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	5.819E+00	2.920E+00	8.739E+00	3.855E+00	4.000E-07
3.918E+00	8.457E+01	1.940E+01	3.647E+00	2.305E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	2.406E+01	4.280E+00	2.834E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	3.525E+01	4.748E+00	4.000E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	4.554E+01	5.227E+00	5.077E+01	6.614E+00	2.500E-06
1.037E+01	9.929E+01	3.563E+01	5.558E+00	4.119E+01	3.298E+00	3.500E-06
1.274E+01	9.977E+01	2.633E+01	5.736E+00	3.206E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	1.512E+01	5.885E+00	2.101E+01	4.598E+00	6.000E-06
2.223E+01	1.000E+02	1.026E+01	5.980E+00	1.624E+01	5.890E+00	8.500E-06
3.146E+01	1.000E+02	6.885E+00	5.977E+00	1.286E+01	6.007E+00	1.250E-05
4.882E+01	1.000E+02	5.550E-01	5.815E+00	6.370E+00	7.838E+00	2.000E-05
6.630E+01	1.000E+02	3.894E-01	8.415E+01	8.454E+01	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 79

ESP PERFORMANCE: EFFICIENCY = 99.2391 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.236E+00 UM OUTLET SIGMAP = 3.639E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 8 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.2123	1.6224	94.3710	6.033	5.6290	41.7103	1.132	58.2897
4.000E-07	1.530	0.253	2.8175	3.0893	90.2545	4.882	9.7455	85.5225	4.052	14.4775
7.000E-07	1.297	0.903	10.8492	9.4587	89.4860	4.723	10.5140	87.5807	4.374	12.4193
1.100E-06	1.183	0.815	8.7455	7.5205	90.6096	4.960	9.3904	89.0594	4.639	10.9406
1.600E-06	1.130	1.520	13.8731	11.4593	92.0129	5.299	7.9871	91.0615	5.063	8.9385
2.500E-06	1.083	3.524	24.9052	20.1145	93.8154	5.835	6.1846	93.2325	5.646	6.7675
3.500E-06	1.059	1.652	9.7131	8.0329	94.8548	6.221	5.1452	94.2348	5.983	5.7652
4.500E-06	1.046	1.652	8.7730	7.5169	95.3527	6.434	4.6473	94.6051	6.122	5.3949
6.000E-06	1.035	1.982	6.4826	5.9891	97.1378	7.451	2.8622	96.4173	6.980	3.5827
8.500E-06	1.024	3.304	6.5732	6.3942	98.2590	8.493	1.7410	97.7055	7.914	2.2945
1.250E-05	1.017	4.846	5.5095	5.6397	99.0051	9.666	0.9949	98.6202	8.981	1.3798
2.000E-05	1.010	12.115	1.0816	2.8513	99.9219	15.001	0.0781	99.7210	12.332	0.2790
2.750E-05	1.008	67.401	0.4642	10.3112	99.9940	20.373	0.0060	99.8186	13.235	0.1814

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.1249
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.572E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.297E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 9.935

SIGMAG= 0.600 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 98.8144
CORRECTED MMD OF EFFLUENT = 3.437E+00
CORRECTED SIGMAP OF EFFLUENT = 3.453E+00
LOG-NORMAL GOODNESS OF FIT = 0.990
CORRECTED PRECIPITATION RATE PARAMETER = 9.30

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	2.766E+01	2.58AE+00	2.864E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	7.896E+00	3.834E+00	1.173E+01	3.855E+00	4.000E-07
3.918E+00	8.457E+01	2.642E+01	4.789E+00	3.121E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	3.405E+01	5.621E+00	3.967E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	5.234E+01	6.234E+00	5.857E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	7.2A3E+01	6.864E+00	7.970E+01	6.614E+00	2.500E-06
1.037E+01	9.929E+01	6.057E+01	7.29AF+00	6.787E+01	3.298E+00	3.500E-06
1.274E+01	9.977E+01	4.682E+01	7.532E+00	5.435E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	3.070E+01	7.72AE+00	3.843E+01	4.598E+00	6.000E-06
2.223E+01	1.000E+02	2.470E+01	7.853E+00	3.255E+01	5.890E+00	8.500E-06
3.146E+01	1.000E+02	2.029E+01	7.848E+00	2.813E+01	6.007E+00	1.250E-05
4.882E+01	1.000E+02	2.969E+00	7.636E+00	1.060E+01	7.83AE+00	2.000E-05
6.630E+01	1.000E+02	3.798E+00	1.105E+02	1.143E+02	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 80

ESP PERFORMANCE: EFFICIENCY = 98.8144 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V
AVG. CURRENT DENSITY = 18.04 NA/CM**2
RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00
OUTLET MMD = 3.437E+00 UM OUTLET SIGMAP = 3.453E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.60
RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 9 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
2.000E-07	2.123	0.033	0.1908	1.3775	91.8187	5.249	8.1813	24.3292	0.585	75.6708
4.000E-07	1.530	0.253	2.3418	2.6741	86.9043	4.262	13.0957	80.8398	3.464	19.1602
7.000E-07	1.297	0.903	9.0162	8.2532	85.8735	4.103	14.1265	83.4317	3.769	16.5683
1.100E-06	1.188	0.815	7.4873	6.7367	87.0024	4.278	12.9976	85.0157	3.980	14.9843
1.600E-06	1.130	1.520	12.3234	10.6403	88.5295	4.540	11.4705	87.3102	4.328	12.6898
2.500E-06	1.083	3.524	23.3765	19.6965	90.6149	4.961	9.3851	89.8679	4.800	10.1321
3.500E-06	1.059	1.652	9.5059	8.1431	91.8589	5.259	8.1411	91.0644	5.064	8.9356
4.500E-06	1.046	1.652	8.8244	7.7602	92.4426	5.415	7.5574	91.4845	5.165	8.5155
6.000E-06	1.035	1.982	7.1634	6.6002	94.8866	6.234	5.1134	93.9633	5.886	6.0367
8.500E-06	1.024	3.304	8.1009	7.6155	96.5311	7.048	3.4689	95.8217	6.658	4.1783
1.250E-05	1.017	4.846	7.6993	7.3277	97.7522	7.957	2.2478	97.2589	7.541	2.7411
2.000E-05	1.010	12.115	2.3700	3.5706	99.7232	12.349	0.2768	99.4657	10.970	0.5343
2.750E-05	1.008	67.401	1.6000	9.6045	99.9664	16.771	0.0336	99.7417	12.494	0.2583

EFFICIENCY = STATED = 99.60 COMPUTED = 99.5393 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 98.5852
MMD OF INLET SIZE DISTRIBUTION = 4.465E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.122E+00
LOG-NORMAL GOODNESS OF FIT = 0.984
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 3.087E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.483E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.928

SIGMAG= 0.800 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 1
RMMD = 10.00
RSIGMA =15.00
CORR. EFF. = 98.1872
CORRECTED MMD OF EFFLUENT = 3.722E+00
CORRECTED SIGMAP OF EFFLUENT = 3.363E+00
LOG-NORMAL GOODNESS OF FIT = 0.994
CORRECTED PRECIPITATION RATE PARAMETER = 8.41

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.790E+00	8.360E+01	4.020E-01	3.316E+00	3.718E+00	5.596E+00	2.000E-07
3.486E+00	8.104E+01	1.061E+01	4.914E+00	1.552E+01	3.855E+00	4.000E-07
3.918E+00	8.457E+01	3.550E+01	6.137E+00	4.164E+01	5.540E+00	7.000E-07
4.769E+00	8.972E+01	4.713E+01	7.203E+00	5.433E+01	4.068E+00	1.100E-06
5.911E+00	9.404E+01	7.516E+01	7.990E+00	8.315E+01	4.657E+00	1.600E-06
8.019E+00	9.782E+01	1.105E+02	8.797E+00	1.193E+02	6.614E+00	2.500E-06
1.037E+01	9.929E+01	9.584E+01	9.353E+00	1.052E+02	3.298E+00	3.500E-06
1.274E+01	9.977E+01	7.614E+01	9.653E+00	8.579E+01	3.977E+00	4.500E-06
1.630E+01	9.996E+01	5.485E+01	9.904E+00	6.475E+01	4.598E+00	6.000E-06
2.223E+01	1.000E+02	4.921E+01	1.006E+01	5.928E+01	5.890E+00	8.500E-06
3.146E+01	1.000E+02	4.583E+01	1.006E+01	5.589E+01	6.007E+00	1.250E-05
4.882E+01	1.000E+02	1.052E+01	9.786E+00	2.030E+01	7.83AE+00	2.000E-05
6.630E+01	1.000E+02	2.116E+01	1.416E+02	1.628E+02	3.806E+01	2.750E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 81

ESP PERFORMANCE: EFFICIENCY = 98.1872 % SCA = 4.769E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 4.159E+04 V

AVG. CURRENT DENSITY = 18.04 NA/CM**2

RESISTIVITY = 5.000E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 4.465E+01 UM INLET SIGMAP = 5.122E+00

OUTLET MMD = 3.722E+00 UM OUTLET SIGMAP = 3.363E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.80

RAPPING MMD = 1.000E+01 UM RAPPING SIGMAP = 1.500E+01

STOP 011111

APPENDIX I

OUTPUT DATA FROM EXAMPLE 10

```
**************************************
*                                    *
*          E.P.A. ESP MODEL          *
*                                    *
*    I.E.P.L.-R.T.P. AND SO.R.I.     *
*                                    *
*       REVISION I,JAN. 1, 1978      *
*                                    *
**************************************

PRINTOUT OF INPUT DATA FOR DATA SET NUMBER  1


DATA ON CARD NUMBER   1

NENDPT =  15   NDATA =  1

DATA ON CARD NUMBER   2

FULL-SCALE,HOT-SIDE ESP; PLANT B;SCA=390FT2/1000ACFM;J=34.3UA/FT2;EST. PROCEED.

DATA ON CARD NUMBER   3

NEST =  2  NDIST =  1  NVI =  1  NX = 10  NY = 10  NITER =  3  NCALC =  1  NRAPD =  1  NEFF =  1  NTEMP =  2  NONID =  2

DATA ON CARD NUMBER   4

DL =  2.51000 GRN/ACF  PL =  36.0000 FT  FTAD = 99.60000 %  DD =  2270.00 KG/M**3  EPS =  1.000E+02
VRATIO =   1.2000  US = 0.000220 M**2/V-SEC  FPATH =   1.0000  EBD = 1500000. V/M  RHOCGS =  1.90E+10 OHM-CM

DATA ON CARD NUMBER   5

ASNUCK( 1) = 0.00  AZIGGY( 1) = 0.00  AZNUMS( 1) =  4.0
ASNUCK( 2) = 0.10  AZIGGY( 2) = 0.25  AZNUMS( 2) =  4.0

DATA ON CARD NUMBER   6

ENDPT( 1) =    0.200 UM   ENDPT( 2) =    0.400 UM   ENDPT( 3) =    0.700 UM   ENDPT( 4) =    1.000 UM   ENDPT( 5) =    1.500 UM
ENDPT( 6) =    2.000 UM   ENDPT( 7) =    3.000 UM   ENDPT( 8) =    4.000 UM   ENDPT( 9) =    5.000 UM   ENDPT(10) =    7.000 UM
```

DATA ON CARD NUMBER 7

ENDPT(11) = 10.000 UM ENDPT(12) = 15.000 UM ENDPT(13) = 25.000 UM ENDPT(14) = 30.000 UM ENDPT(15) = 100.000 UM

DATA ON CARD NUMBER 8

PRCU(1) = 0.0000 % PRCU(2) = 0.1479 % PRCU(3) = 0.5742 % PRCU(4) = 1.0092 % PRCU(5) = 1.7226 %
PRCU(6) = 2.7493 % PRCU(7) = 6.5251 % PRCU(8) = 9.4832 % PRCU(9) = 11.1362 % PRCU(10) = 13.0503 %

DATA ON CARD NUMBER 9

PRCU(11) = 15.6255 % PRCU(12) = 20.1844 % PRCU(13) = 30.9727 % PRCU(14) = 35.4968 % PRCU(15) = 100.0000 %

DATA ON CARD NUMBER 10

NUMSEC = 4 LSECT(1) = 9 LSECT(2) = 9 LSECT(3) = 9 LSECT(4) = 9

DATA ON CARD NUMBER 11

AS(1) = 4.2120E+04 FT**2 VOS(1) = 3.5880E+04 V TCS(1) = 1.2200E+00 A WLS(1) = 5.6160E+04 FT
ACS(1) = 5.4500E-02 IN BS(1) = 4.5000E+00 IN NWS(1) = 1.2000E+01

DATA ON CARD NUMBER 12

SYS(1) = 4.5000E+00 IN VGS(1) = 4.3207E+05 FT**3/MIN VGASS(1) = 3.7958E+00 FT/SEC TEMPS(1) = 6.2400E+02 F
PS(1) = 1.0000E+00 ATM VISS(1) = 2.8000E-05 KG/M-SEC LINCS(1) = 1.0000E+00 FT

DATA ON CARD NUMBER 13

AS(2) = 4.2120E+04 FT**2 VOS(2) = 3.3950E+04 V TCS(2) = 1.6720E+00 A WLS(2) = 5.6160E+04 FT
ACS(2) = 5.4500E-02 IN BS(2) = 4.5000E+00 IN NWS(2) = 1.2000E+01

DATA ON CARD NUMBER 14

SYS(2) = 4.5000E+00 IN VGS(2) = 4.3207E+05 FT**3/MIN VGASS(2) = 3.7958E+00 FT/SEC TEMPS(2) = 6.2400E+02 F
PS(2) = 1.0000E+00 ATM VISS(2) = 2.8000E-05 KG/M-SEC LINCS(2) = 1.0000E+00 FT

DATA ON CARD NUMBER 15

AS(3) = 4.2120E+04 FT**2 VDS(3) = 2.9130E+04 V TCS(3) = 1.4200E+00 A WLS(3) = 5.6160E+04 FT
ACS(3) = 5.4500E-02 IN BS(3) = 4.5000E+00 IN NWS(3) = 1.2000E+01

DATA ON CARD NUMBER 16

SYS(3) = 4.5000E+00 IN VGS(3) = 4.3207E+05 FT**3/MIN VGASS(3) = 3.7958E+00 FT/SEC TEMPS(3) = 6.2400E+02 F
PS(3) = 1.0000E+00 ATM VISS(3) = 2.8000E-05 KG/M-SEC LINCS(3) = 1.0000E+00 FT

DATA ON CARD NUMBER 17

AS(4) = 4.2120E+04 FT**2 VDS(4) = 2.7500E+04 V TCS(4) = 1.4600E+00 A WLS(4) = 5.6160E+04 FT
ACS(4) = 5.4500E-02 IN BS(4) = 4.5000E+00 IN NWS(4) = 1.2000E+01

DATA ON CARD NUMBER 18

SYS(4) = 4.5000E+00 IN VGS(4) = 4.3207E+05 FT**3/MIN VGASS(4) = 3.7958E+00 FT/SEC TEMPS(4) = 6.2400E+02 F
PS(4) = 1.0000E+00 ATM VISS(4) = 2.8000E-05 KG/M-SEC LINCS(4) = 1.0000E+00 FT

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,HOT-SIDE ESP: PLANT B;SCA=390F12/1000ACFM;J=34.3UA/FT2;EST. PROCED.

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 7.123E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 3.588E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.115E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.220E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 5.918E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.5597	3.139E+05	1.7938E+05	8.2047E+12	31.1	4.21E-05	4.140E-03	1.166E-01	1.35E-06	3.10E-04	1
1.3610	3.139E+05	1.7938E+05	9.4026E+12	31.1	2.00E-05	7.275E-04	2.049E-02	8.40E-07	3.11E-04	2
1.2586	3.139E+05	1.7938E+05	1.0167E+13	31.1	1.07E-05	2.597E-04	7.318E-03	6.60E-07	3.11E-04	3
1.1904	3.139E+05	1.7938E+05	1.0750E+13	31.1	6.31E-06	1.473E-04	4.151E-03	5.57E-07	3.11E-04	4
1.1418	3.139E+05	1.7938E+05	1.1207E+13	31.1	4.25E-06	9.762E-05	2.750E-03	4.81E-07	3.11E-04	5
1.1064	3.139E+05	1.7938E+05	1.1566E+13	31.1	3.34E-06	7.003E-05	1.973E-03	4.21E-07	3.11E-04	6
1.0802	3.139E+05	1.7938E+05	1.1847E+13	31.1	2.96E-06	5.295E-05	1.492E-03	3.71E-07	3.11E-04	7
1.0606	3.139E+05	1.7938E+05	1.2065E+13	31.1	2.68E-06	4.146E-05	1.168E-03	3.28E-07	3.11E-04	8
1.0460	3.139E+05	1.7938E+05	1.2234E+13	31.1	2.47E-06	3.324E-05	9.364E-04	2.92E-07	3.11E-04	9

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 9.761E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 3.395E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 4.268E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.672E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 8.110E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0241	2.970E+05	1.6973E+05	1.8098E+13	42.7	2.38E-06	2.577E-05	7.259E-04	2.47E-07	4.27E-04	10
1.0185	2.970E+05	1.6973E+05	1.8198E+13	42.7	2.30E-06	2.143E-05	6.037E-04	2.22E-07	4.27E-04	11
1.0142	2.970E+05	1.6973E+05	1.8276E+13	42.7	2.24E-06	1.798E-05	5.065E-04	2.00E-07	4.27E-04	12
1.0109	2.970E+05	1.6973E+05	1.8335E+13	42.7	2.18E-06	1.518E-05	4.277E-04	1.80E-07	4.27E-04	13
1.0084	2.970E+05	1.6973E+05	1.8381E+13	42.7	2.13E-06	1.289E-05	3.632E-04	1.62E-07	4.27E-04	14
1.0065	2.970E+05	1.6973E+05	1.8416E+13	42.7	2.08E-06	1.100E-05	3.098E-04	1.47E-07	4.27E-04	15
1.0050	2.970E+05	1.6973E+05	1.8443E+13	42.7	2.03E-06	9.420E-06	2.654E-04	1.32E-07	4.27E-04	16
1.0038	2.970E+05	1.6973E+05	1.8464E+13	42.7	1.99E-06	8.097E-06	2.281E-04	1.20E-07	4.27E-04	17
1.0030	2.970E+05	1.6973E+05	1.8480E+13	42.7	1.95E-06	6.981E-06	1.967E-04	1.08E-07	4.27E-04	18

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M

APPLIED VOLTAGE = 2.913E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M

TOTAL CURRENT = 1.420E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M

CURRENT/M = 8.290E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

CURRENT DENSITY = 3.625E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

DEPOSIT E FIELD = 6.888E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0023	2.549E+05	1.4563E+05	1.8304E+13	36.3	1.91E-06	5.231E-06	1.474E-04	8.45E-08	3.62E-04	19
1.0018	2.549E+05	1.4563E+05	1.8313E+13	36.3	1.87E-06	4.625E-06	1.303E-04	7.74E-08	3.62E-04	20
1.0014	2.549E+05	1.4563E+05	1.8320E+13	36.3	1.84E-06	4.096E-06	1.154E-04	7.10E-08	3.62E-04	21
1.0011	2.549E+05	1.4563E+05	1.8325E+13	36.3	1.80E-06	3.634E-06	1.024E-04	6.51E-08	3.62E-04	22
1.0009	2.549E+05	1.4563E+05	1.8330E+13	36.3	1.77E-06	3.230E-06	9.099E-05	5.97E-08	3.62E-04	23
1.0007	2.549E+05	1.4563E+05	1.8333E+13	36.3	1.72E-06	2.874E-06	8.097E-05	5.47E-08	3.62E-04	24
1.0005	2.549E+05	1.4563E+05	1.8336E+13	36.3	1.67E-06	2.561E-06	7.216E-05	5.02E-08	3.62E-04	25
1.0004	2.549E+05	1.4563E+05	1.8338E+13	36.3	1.62E-06	2.286E-06	6.440E-05	4.60E-08	3.62E-04	26
1.0003	2.549E+05	1.4563E+05	1.8340E+13	36.3	1.57E-06	2.043E-06	5.754E-05	4.22E-08	3.62E-04	27

CALCULATION IS IN SECTION NO. = 4 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 8.524E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 2.750E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.727E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.460E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 7.082E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 14.22

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0002	2.406E+05	1.3748E+05	1.9976E+13	37.3	1.53E-06	1.730E-06	4.875E-05	3.67E-08	3.73E-04	28
1.0002	2.406E+05	1.3748E+05	1.9977E+13	37.3	1.48E-06	1.560E-06	4.394E-05	3.39E-08	3.73E-04	29
1.0002	2.406E+05	1.3748E+05	1.9978E+13	37.3	1.44E-06	1.407E-06	3.964E-05	3.13E-08	3.73E-04	30
1.0001	2.406E+05	1.3748E+05	1.9978E+13	37.3	1.40E-06	1.271E-06	3.580E-05	2.89E-08	3.73E-04	31
1.0001	2.406E+05	1.3748E+05	1.9979E+13	37.3	1.36E-06	1.149E-06	3.237E-05	2.67E-08	3.73E-04	32
1.0001	2.406E+05	1.3748E+05	1.9979E+13	37.3	1.31E-06	1.040E-06	2.929E-05	2.47E-08	3.73E-04	33
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.27E-06	9.414E-07	2.652E-05	2.28E-08	3.73E-04	34
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.24E-06	8.534E-07	2.404E-05	2.11E-08	3.73E-04	35
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.21E-06	7.742E-07	2.181E-05	1.95E-08	3.73E-04	36

EST. EFFICIENCY = 99.60 UNCORRECTED COMPUTED EFFICIENCY = 99.86

INCREMENTAL ANALYSIS OF PRECIPITATOR PERFORMANCE

FULL-SCALE,HOT-SIDE ESP: PLANT B;SCA=390FT2/1000ACFM;J=34.3UA/FT2;EST. PROCED.

CALCULATION IS IN SECTION NO. = 1 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 7.123E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC

APPLIED VOLTAGE = 3.588E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.115E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC

TOTAL CURRENT = 1.220E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 5.918E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M

DUST WEIGHT = 1.175E+00 KG/SEC LENGTH INCR. =0.30500000 M INPUT EFF./INCR. = 16.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.6546	3.139E+05	1.7938E+05	7.7340E+12	31.1	4.21E-05	4.126E-03	1.163E-01	1.33E-06	3.10E-04	1
1.4109	3.139E+05	1.7938E+05	9.0698E+12	31.1	2.05E-05	7.362E-04	2.074E-02	8.35E-07	3.11E-04	2
1.2861	3.139E+05	1.7938E+05	9.9497E+12	31.1	1.08E-05	2.618E-04	7.376E-03	6.58E-07	3.11E-04	3
1.2048	3.139E+05	1.7938E+05	1.0622E+13	31.1	6.37E-06	1.482E-04	4.175E-03	5.56E-07	3.11E-04	4
1.1483	3.139E+05	1.7938E+05	1.1144E+13	31.1	4.27E-06	9.811E-05	2.764E-03	4.81E-07	3.11E-04	5
1.1081	3.139E+05	1.7938E+05	1.1548E+13	31.1	3.35E-06	7.035E-05	1.982E-03	4.21E-07	3.11E-04	6
1.0792	3.139E+05	1.7938E+05	1.1858E+13	31.1	2.97E-06	5.316E-05	1.498E-03	3.71E-07	3.11E-04	7
1.0582	3.139E+05	1.7938E+05	1.2093E+13	31.1	2.68E-06	4.161E-05	1.172E-03	3.28E-07	3.11E-04	8
1.0429	3.139E+05	1.7938E+05	1.2270E+13	31.1	2.48E-06	3.335E-05	9.396E-04	2.92E-07	3.11E-04	9

CALCULATION IS IN SECTION NO. = 2 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 9.761E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 3.395E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 4.268E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.672E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 8.110E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 16.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0219	2.970E+05	1.6973E+05	1.8138E+13	42.7	2.38E-06	2.585E-05	7.282E-04	2.48E-07	4.27E-04	10
1.0163	2.970E+05	1.6973E+05	1.8238E+13	42.7	2.31E-06	2.152E-05	6.064E-04	2.23E-07	4.27E-04	11
1.0122	2.970E+05	1.6973E+05	1.8312E+13	42.7	2.24E-06	1.805E-05	5.086E-04	2.01E-07	4.27E-04	12
1.0091	2.970E+05	1.6973E+05	1.8368E+13	42.7	2.18E-06	1.524E-05	4.294E-04	1.81E-07	4.27E-04	13
1.0068	2.970E+05	1.6973E+05	1.8410E+13	42.7	2.13E-06	1.294E-05	3.645E-04	1.63E-07	4.27E-04	14
1.0051	2.970E+05	1.6973E+05	1.8441E+13	42.7	2.08E-06	1.103E-05	3.109E-04	1.47E-07	4.27E-04	15
1.0038	2.970E+05	1.6973E+05	1.8465E+13	42.7	2.04E-06	9.449E-06	2.662E-04	1.33E-07	4.27E-04	16
1.0029	2.970E+05	1.6973E+05	1.8482E+13	42.7	1.99E-06	8.120E-06	2.288E-04	1.20E-07	4.27E-04	17
1.0021	2.970E+05	1.6973E+05	1.8495E+13	42.7	1.95E-06	6.999E-06	1.972E-04	1.08E-07	4.27E-04	18

CALCULATION IS IN SECTION NO. = 3 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 8.290E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 2.913E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.625E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.420E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 6.888E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 16.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0016	2.549E+05	1.4563E+05	1.8316E+13	36.3	1.91E-06	5.243E-06	1.477E-04	8.46E-08	3.62E-04	19
1.0012	2.549E+05	1.4563E+05	1.8323E+13	36.3	1.87E-06	4.635E-06	1.306E-04	7.76E-08	3.62E-04	20
1.0009	2.549E+05	1.4563E+05	1.8329E+13	36.3	1.84E-06	4.104E-06	1.156E-04	7.11E-08	3.62E-04	21
1.0007	2.549E+05	1.4563E+05	1.8333E+13	36.3	1.80E-06	3.641E-06	1.026E-04	6.52E-08	3.62E-04	22
1.0006	2.549E+05	1.4563E+05	1.8336E+13	36.3	1.77E-06	3.235E-06	9.114E-05	5.99E-08	3.62E-04	23
1.0004	2.549E+05	1.4563E+05	1.8338E+13	36.3	1.72E-06	2.874E-06	8.109E-05	5.48E-08	3.62E-04	24
1.0003	2.549E+05	1.4563E+05	1.8340E+13	36.3	1.67E-06	2.565E-06	7.226E-05	5.03E-08	3.62E-04	25
1.0002	2.549E+05	1.4563E+05	1.8341E+13	36.3	1.62E-06	2.288E-06	6.447E-05	4.61E-08	3.62E-04	26
1.0002	2.549E+05	1.4563E+05	1.8343E+13	36.3	1.57E-06	2.045E-06	5.760E-05	4.23E-08	3.62E-04	27

CALCULATION IS IN SECTION NO. = 4 AND THE SECTION LENGTH IS = 2.7450 M

COLLECTION AREA = 3.917E+03 M2
WIRE TO PLATE = 1.143E-01 M
CURRENT/M = 8.524E-05 AMP/M
1/2 WIRE TO WIRE = 1.143E-01 M
TEMPERATURE = 601.667 K
ION MOBILITY = 4.846E-04 M2/VOLT-SEC
DUST WEIGHT = 1.175E+00 KG/SEC

APPLIED VOLTAGE = 2.750E+04 VOLTS
CORONA WIRE RADIUS = 1.384E-03 M
CURRENT DENSITY = 3.727E-04 AMP/M2
GAS FLOW RATE = 2.044E+02 M3/SEC
PRESSURE = 1.000 ATM
MEAN THERMAL SPEED = 6.311E+02 M/SEC
LENGTH INCR. =0.30500000 M

TOTAL CURRENT = 1.460E+00 AMPS
CORONA WIRE LENGTH = 1.713E+04 M
DEPOSIT E FIELD = 7.082E+04 VOLT/M
GAS VELOCITY = 1.158E+00 M/SEC
VISCOSITY = 2.800E-05 KG/M-SEC
PART. PATH PARAM. = 1.154E-07 M
INPUT EFF./INCR. = 16.63

ROVRI	ERAVG	EPLT	AFID	CMCD	MMD	WEIGHT	DUST LAYER	J(PART)	J(ION)	INCR. NO.
1.0001	2.406E+05	1.3748E+05	1.9978E+13	37.3	1.52E-06	1.732E-06	4.880E-05	3.67E-08	3.73E-04	28
1.0001	2.406E+05	1.3748E+05	1.9979E+13	37.3	1.48E-06	1.561E-06	4.398E-05	3.39E-08	3.73E-04	29
1.0001	2.406E+05	1.3748E+05	1.9979E+13	37.3	1.44E-06	1.408E-06	3.967E-05	3.13E-08	3.73E-04	30
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.39E-06	1.272E-06	3.582E-05	2.89E-08	3.73E-04	31
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.35E-06	1.149E-06	3.238E-05	2.67E-08	3.73E-04	32
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.31E-06	1.040E-06	2.930E-05	2.47E-08	3.73E-04	33
1.0000	2.406E+05	1.3748E+05	1.9980E+13	37.3	1.27E-06	9.418E-07	2.653E-05	2.28E-08	3.73E-04	34
1.0000	2.406E+05	1.3748E+05	1.9981E+13	37.3	1.24E-06	8.536E-07	2.405E-05	2.11E-08	3.73E-04	35
					1.21E-06	7.744E-07	2.182E-05	1.95E-08	3.73E-04	36

CHARGING RATES FOR PARTICLE SIZES FROM SUBROUTINE CHARGN OR CHGSUM

SUM OF CLASSICAL FIELD AND DIFFUSIONAL CHARGES USED FOR PARTICLE CHARGING

INCREMENT NO.	Q/QSATF FOR INDICATED PARTICLE SIZES							
	0.3000E-06	0.5500E-06	0.8500E-06	0.1250E-05	0.1750E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	1.3047	1.3047	1.3047	1.3047	1.3047	1.3047	1.2494	1.2156
2	2.2101	1.9978	1.8082	1.6584	1.5506	1.4597	1.3931	1.3534
3	2.3817	2.1292	1.9129	1.7447	1.6250	1.5248	1.4518	1.4086
4	2.4967	2.2149	1.9792	1.7978	1.6694	1.5625	1.4850	1.4392
5	2.5827	2.2778	2.0270	1.8352	1.7001	1.5879	1.5068	1.4591
6	2.6511	2.3273	2.0640	1.8637	1.7231	1.6066	1.5227	1.4733
7	2.7077	2.3679	2.0941	1.8866	1.7413	1.6212	1.5348	1.4840
8	2.7558	2.4021	2.1193	1.9056	1.7563	1.6331	1.5445	1.4926
9	2.7976	2.4317	2.1409	1.9218	1.7690	1.6430	1.5526	1.4996
10	2.8463	2.4650	2.1641	1.9381	1.7808	1.6513	1.5586	1.4996
11	2.8881	2.4935	2.1839	1.9521	1.7909	1.6585	1.5586	1.4996
12	2.9246	2.5184	2.2013	1.9643	1.7998	1.6585	1.5586	1.4996
13	2.9570	2.5406	2.2167	1.9751	1.7998	1.6585	1.5586	1.4996
14	2.9862	2.5605	2.2306	1.9849	1.7998	1.6585	1.5586	1.4996
15	3.0127	2.5786	2.2432	1.9849	1.7998	1.6585	1.5586	1.4996
16	3.0370	2.5951	2.2547	1.9849	1.7998	1.6585	1.5586	1.4996
17	3.0593	2.6104	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
18	3.0801	2.6245	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
19	3.0992	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
20	3.1172	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
21	3.1341	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
22	3.1500	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
23	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
24	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
25	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
26	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
27	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
28	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
29	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
30	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
31	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
32	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
33	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
34	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
35	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996
36	3.1651	2.6376	2.2654	1.9849	1.7998	1.6585	1.5586	1.4996

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04	0.6500E-04
1	1.1842	1.1544	1.1299	1.1088	1.0985	1.0813
2	1.3168	1.2824	1.2543	1.2304	1.2188	1.1996
3	1.3688	1.3317	1.3015	1.2758	1.2635	1.2431
4	1.3972	1.3581	1.3263	1.2994	1.2865	1.2653
5	1.4153	1.3746	1.3417	1.3138	1.3005	1.2786
6	1.4280	1.3861	1.3522	1.3236	1.3099	1.2874
7	1.4376	1.3946	1.3598	1.3305	1.3166	1.2936
8	1.4451	1.4012	1.3657	1.3358	1.3216	1.2936
9	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936

10	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
11	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
12	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
13	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
14	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
15	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
16	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
17	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
18	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
19	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
20	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
21	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
22	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
23	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
24	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
25	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
26	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
27	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
28	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
29	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
30	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
31	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
32	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
33	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
34	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
35	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936
36	1.4512	1.4012	1.3657	1.3358	1.3216	1.2936

CHARGE ACCUMULATED ON PARTICLE SIZES IN EACH INCREMENT

INCREMENT	CHARGE FOR INDICATED PARTICLE SIZES							
	0.3000E-06	0.5500E-06	0.8500E-06	0.1250E-05	0.1750E-05	0.2500E-05	0.3500E-05	0.4500E-05
1	0.39845E-17	0.10717E-16	0.23786E-16	0.49780E-16	0.96099E-16	0.19443E-15	0.36332E-15	0.58325E-15
2	0.67495E-17	0.16409E-16	0.32963E-16	0.63272E-16	0.11421E-15	0.21752E-15	0.40511E-15	0.64937E-15
3	0.72736E-17	0.17489E-16	0.34872E-16	0.66567E-16	0.11969E-15	0.22721E-15	0.42219E-15	0.67585E-15
4	0.76247E-17	0.18192E-16	0.36081E-16	0.68591E-16	0.12296E-15	0.23283E-15	0.43183E-15	0.69053E-15
5	0.78873E-17	0.18709E-16	0.36952E-16	0.70019E-16	0.12522E-15	0.23663E-15	0.43819E-15	0.70006E-15
6	0.80963E-17	0.19116E-16	0.37627E-16	0.71108E-16	0.12691E-15	0.23942E-15	0.44279E-15	0.70687E-15
7	0.82692E-17	0.19449E-16	0.38176E-16	0.71982E-16	0.12826E-15	0.24159E-15	0.44632E-15	0.71203E-15
8	0.84161E-17	0.19730E-16	0.38635E-16	0.72707E-16	0.12936E-15	0.24336E-15	0.44915E-15	0.71613E-15
9	0.85436E-17	0.19973E-16	0.39029E-16	0.73324E-16	0.13029E-15	0.24483E-15	0.45149E-15	0.71948E-15
10	0.86923E-17	0.20246E-16	0.39451E-16	0.73946E-16	0.13116E-15	0.24608E-15	0.45323E-15	0.71948E-15
11	0.88199E-17	0.20481E-16	0.39814E-16	0.74479E-16	0.13191E-15	0.24714E-15	0.45323E-15	0.71948E-15
12	0.89315E-17	0.20685E-16	0.40131E-16	0.74945E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
13	0.90306E-17	0.20867E-16	0.40412E-16	0.75359E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
14	0.91197E-17	0.21031E-16	0.40665E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
15	0.92006E-17	0.21179E-16	0.40894E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
16	0.92747E-17	0.21315E-16	0.41105E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
17	0.93430E-17	0.21441E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
18	0.94063E-17	0.21557E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
19	0.94648E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
20	0.95196E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
21	0.95712E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
22	0.96198E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
23	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
24	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
25	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
26	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
27	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
28	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
29	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
30	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
31	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
32	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
33	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
34	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
35	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15
36	0.96659E-17	0.21664E-16	0.41298E-16	0.75731E-16	0.13256E-15	0.24714E-15	0.45323E-15	0.71948E-15

	0.6000E-05	0.8500E-05	0.1250E-04	0.2000E-04	0.2750E-04	0.4500E-04
1	0.10087E-14	0.19717E-14	0.41711E-14	0.10875E-13	0.19618E-13	0.10787E-12
2	0.11216E-14	0.21903E-14	0.46305E-14	0.11624E-13	0.21766E-13	0.11967E-12
3	0.11660E-14	0.22745E-14	0.48045E-14	0.12053E-13	0.22564E-13	0.12401E-12
4	0.11901E-14	0.23195E-14	0.48961E-14	0.12276E-13	0.22976E-13	0.12622E-12
5	0.12056E-14	0.23478E-14	0.49529E-14	0.12412E-13	0.23225E-13	0.12755E-12
6	0.12164E-14	0.23674E-14	0.49916E-14	0.12508E-13	0.23392E-13	0.12843E-12
7	0.12246E-14	0.23819E-14	0.50199E-14	0.12570E-13	0.23512E-13	0.12905E-12
8	0.12309E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
9	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
10	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
11	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
12	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
13	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12

14	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
15	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
16	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
17	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
18	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
19	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
20	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
21	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
22	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
23	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
24	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
25	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
26	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
27	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
28	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
29	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
30	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
31	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
32	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
33	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
34	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
35	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12
36	0.12361E-14	0.23931E-14	0.50415E-14	0.12620E-13	0.23602E-13	0.12905E-12

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 1 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP M	NO-RAP P	COR. EFF.	COR. M	COR. P
3.000E-07	2.040	0.148	1.2983	0.4215	99.7973	8.088	0.2027	99.7248	7.689	0.2752
5.500E-07	1.540	0.426	10.7597	3.1792	99.4172	6.711	0.5828	99.2799	6.435	0.7201
8.500E-07	1.343	0.435	12.2804	4.1358	99.3482	6.565	0.6518	99.0820	6.118	0.9180
1.250E-06	1.232	0.713	15.7106	6.7947	99.4915	6.889	0.5085	99.0803	6.116	0.9197
1.750E-06	1.166	1.027	15.2128	7.4556	99.6579	7.406	0.3421	99.2987	6.470	0.7013
2.500E-06	1.116	3.776	29.6412	15.4224	99.8187	8.234	0.1813	99.6056	7.220	0.3944
3.500E-06	1.083	2.958	10.9430	10.5675	99.9146	9.216	0.0854	99.6550	7.395	0.3450
4.500E-06	1.064	1.653	3.2263	7.7855	99.9549	10.050	0.0451	99.5452	7.034	0.4548
6.000E-06	1.048	1.914	0.4661	11.2070	99.9944	12.764	0.0056	99.4346	6.750	0.5654
8.500E-06	1.034	2.575	0.0991	11.0388	99.9991	15.168	0.0009	99.5861	7.157	0.4139
1.250E-05	1.023	4.559	0.0196	9.8983	99.9999	21.499	0.0001	99.7903	8.044	0.2097
2.000E-05	1.015	10.788	0.0463	7.5397	99.9999	33.350	0.0001	99.9325	9.523	0.0675
2.750E-05	1.011	4.524	0.0194	1.5366	99.9999	45.184	0.0001	99.9672	10.464	0.0328
6.500E-05	1.004	64.503	0.2771	3.0171	99.9999	103.896	0.0001	99.9955	13.050	0.0045

EFFICIENCY = STATED = 99.86 COMPUTED = 99.8568 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.9769
MMD OF INLET SIZE DISTRIBUTION = 5.172E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.542E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.580E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 1.850E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 10.922

SIGMAG= 0.000 WITH 0.000 SNEAKAGE OVER 4.000 STAGES
NTEMP = 2
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.9034
CORRECTED MMD OF EFFLUENT = 4.466E+00
CORRECTED SIGMAP OF EFFLUENT = 2.713E+00
LOG-NORMAL GOODNESS OF FIT = 0.998
CORRECTED PRECIPITATION RATE PARAMETER = 9.06

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.611E+00	9.372E+01	1.264E-01	4.522E-02	1.716E-01	1.45AE-01	3.000E-07
3.415E+00	9.271E+01	1.297E+00	3.058E-01	1.603E+00	7.960E-01	5.500E-07
3.730E+00	9.427E+01	2.323E+00	9.488E-01	3.272E+00	1.574E+00	8.500E-07
4.326E+00	9.637E+01	2.615E+00	2.114E+00	4.729E+00	3.988E+00	1.250E-06
5.161E+00	9.809E+01	3.568E+00	3.745E+00	7.313E+00	5.012E+00	1.750E-06
6.484E+00	9.931E+01	4.933E+00	5.801E+00	1.073E+01	1.094E+01	2.500E-06
8.265E+00	9.982E+01	2.567E+00	7.799E+00	1.037E+01	1.044E+01	3.500E-06
1.005E+01	9.995E+01	9.756E-01	8.870E+00	9.846E+00	9.208E+00	4.500E-06
1.276E+01	9.999E+01	9.34AE-02	9.306E+00	9.399E+00	1.457E+01	6.000E-06
1.517E+01	1.000E+02	1.875E-02	8.715E+00	8.734E+00	1.446E+01	8.500E-06
2.150E+01	1.000E+02	3.259E-03	6.889E+00	6.892E+00	1.299E+01	1.250E-05
3.335E+01	1.000E+02	6.121E-03	4.165E+00	4.171E+00	9.898E+00	2.000E-05
4.518E+01	1.000E+02	7.192E-03	2.378E+00	2.386E+00	2.017E+00	2.750E-05
1.039E+02	1.000E+02	1.553E-02	7.072E-01	7.227E-01	3.961E+00	6.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 1

ESP PERFORMANCE: EFFICIENCY = 99.9034 % SCA = 7.667E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.161E+04 V

AVG. CURRENT DENSITY = 36.84 NA/CM**2

RESISTIVITY = 1.900E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 5.172E+01 UM INLET SIGMAP = 5.542E+00

OUTLET MMD = 4.466E+00 UM OUTLET SIGMAP = 2.713E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.00 /SECTION GAS VELOCITY SIGMAG = 0.00

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

PARTICLE SIZE RANGE STATISTICS

CORRECTIONS FOR NONIDEALITIES USING SET NO. 2 OF CORRECTION PARAMETERS

SIZE	CCF	INLET %	OUTLET %	COR. OUTLET %	NO-RAP EFF.	NO-RAP W	NO-RAP P	COR. EFF.	COR. W	COR. P
3.000E-07	2.040	0.148	0.8050	0.4004	99.1832	6.271	0.8168	98.9480	5.940	1.0520
5.500E-07	1.540	0.426	5.1395	2.4736	98.1909	5.233	1.8091	97.7455	4.946	2.2545
8.500E-07	1.343	0.435	5.9383	3.2600	97.9515	5.071	2.0485	97.0881	4.613	2.9119
1.250E-06	1.232	0.713	8.6366	5.7841	98.1834	5.228	1.8166	96.8497	4.510	3.1503
1.750E-06	1.166	1.027	10.2329	7.0292	98.5043	5.481	1.4957	97.3396	4.730	2.6604
2.500E-06	1.116	3.776	28.3510	17.6670	98.8733	5.851	1.1267	98.1820	5.227	1.8180
3.500E-06	1.083	2.958	17.3290	13.1009	99.1209	6.175	0.8791	98.2791	5.299	1.7209
4.500E-06	1.064	1.653	8.6842	9.0072	99.2117	6.317	0.7883	97.8828	5.028	2.1172
6.000E-06	1.048	1.914	5.0679	10.9003	99.6027	7.211	0.3973	97.7872	4.971	2.2128
8.500E-06	1.034	2.575	7.8180	11.8974	99.5444	7.032	0.4556	98.2049	5.244	1.7951
1.250E-05	1.023	4.559	1.8762	8.7026	99.9382	9.639	0.0618	99.2583	6.396	0.7417
2.000E-05	1.015	10.788	0.0757	6.1063	99.9989	14.949	0.0011	99.7801	7.982	0.2199
2.750E-05	1.011	4.524	0.0030	1.2385	99.9999	45.184	0.0001	99.8936	8.929	0.1064
6.500E-05	1.004	64.503	0.0426	2.4321	99.9999	103.896	0.0001	99.9853	11.515	0.0147

EFFICIENCY = STATED = 99.86 COMPUTED = 99.8568 CONVERGENCE OBTAINED

ADJUSTED NO-RAP EFF. = 99.8499
MMD OF INLET SIZE DISTRIBUTION = 5.172E+01
SIGMAP OF INLET SIZE DISTRIBUTION = 5.542E+00
LOG-NORMAL GOODNESS OF FIT = 0.992
MMD OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.462E+00
SIGMAP OF EFFLUENT UNDER NO-RAP CONDITIONS = 2.095E+00
LOG-NORMAL GOODNESS OF FIT = 0.996
PRECIPITATION RATE PARAMETER UNDER NO-RAP CONDITIONS = 8.481

SIGMAG= 0.250 WITH 0.100 SNEAKAGE OVER 4.000 STAGES
NTEMP = 2
RMMD = 6.00
RSIGMA = 2.50
CORR. EFF. = 99.6114
CORRECTED MMD OF EFFLUENT = 4.382E+00
CORRECTED SIGMAP OF EFFLUENT = 2.567E+00
LOG-NORMAL GOODNESS OF FIT = 0.999
CORRECTED PRECIPITATION RATE PARAMETER = 7.24

UNADJUSTED MIGRATION VELOCITIES AND EFFICIENCIES, AND DISCRETE OUTLET MASS LOADINGS

IDEAL UNADJUSTED MIG. VEL.(CM/SEC)	IDEAL UNADJUSTED EFFICIENCY(%)	NO-RAP DM/DLOGD(MG/DSCM)	RAPPING PUFF DM/DLOGD(MG/DSCM)	NO-RAP+RAP PUFF DM/DLOGD(MG/DSCM)	RAPPING PUFF DISTRIBUTION(%)	PARTICLE DIAM.(M)
3.611E+00	9.372E+01	5.093E-01	1.467E-01	6.560E-01	1.458E-01	3.000E-07
3.415E+00	9.271E+01	4.028E+00	9.917E-01	5.019E+00	7.960E-01	5.500E-07
3.730E+00	9.427E+01	7.301E+00	3.077E+00	1.038E+01	1.574E+00	8.500E-07
4.326E+00	9.637E+01	9.341E+00	6.858E+00	1.620E+01	3.988E+00	1.250E-06
5.161E+00	9.809E+01	1.560E+01	1.215E+01	2.775E+01	5.012E+00	1.750E-06
6.484E+00	9.931E+01	3.066E+01	1.881E+01	4.948E+01	1.094E+01	2.500E-06
8.265E+00	9.982E+01	2.642E+01	2.530E+01	5.171E+01	1.044E+01	3.500E-06
1.005E+01	9.995E+01	1.707E+01	2.877E+01	4.584E+01	9.208E+00	4.500E-06
1.276E+01	9.999E+01	6.605E+00	3.018E+01	3.679E+01	1.457E+01	6.000E-06
1.517E+01	1.000E+02	9.612E+00	2.827E+01	3.788E+01	1.446E+01	8.500E-06
2.150E+01	1.000E+02	2.029E+00	2.234E+01	2.437E+01	1.299E+01	1.250E-05
3.335E+01	1.000E+02	6.498E-02	1.351E+01	1.357E+01	9.898E+00	2.000E-05
4.518E+01	1.000E+02	7.192E-03	7.714E+00	7.721E+00	2.017E+00	2.750E-05
1.039E+02	1.000E+02	1.553E-02	2.294E+00	2.309E+00	3.961E+00	6.500E-05

SUMMARY TABLE OF ESP OPERATING
PARAMETERS AND PERFORMANCE

DATA SET NUMBER 2

ESP PERFORMANCE: EFFICIENCY = 99.6114 % SCA = 7.667E+01 M**2/(M**3/SEC)

ELECTRICAL CONDITIONS: AVG. APPLIED VOLTAGE = 3.161E+04 V

AVG. CURRENT DENSITY = 36.84 NA/CM**2

RESISTIVITY = 1.900E+10 OHM-CM

SIZE DISTRIBUTIONS: INLET MMD = 5.172E+01 UM INLET SIGMAP = 5.542E+00

OUTLET MMD = 4.382E+00 UM OUTLET SIGMAP = 2.567E+00

NONIDEAL PARAMETERS: GAS SNEAKAGE FRACTION = 0.10 /SECTION GAS VELOCITY SIGMAG = 0.25

RAPPING MMD = 6.000E+00 UM RAPPING SIGMAP = 2.500E+00

STOP 011111